

The newswweekly of enterprise network computing

# NetworkWorld



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March 20, 2000 Volume 17, Number 12

The network portal: www.nwfusion.com

## Cisco, Microsoft give IPv6 shot in the arm

BY CAROLYN DUFFY MARSAN

**TELLURIDE, COLO.** — Two heavyweight holdouts — Cisco and Microsoft — last week threw their support behind IPv6, giving the long-anticipated upgrade to the Internet's primary communications protocol a much-needed boost.

Both companies announced plans to support IPv6 in software that will be released this year: a Cisco IOS upgrade and Microsoft's IPv6 stack for Windows 2000. The announcements were made at the IPv6



Cisco's Judy Estrin: Migration tools are key.

Global Summit, a gathering of 150 network developers and engineers held in Telluride, Colo.

For corporate network managers, the Cisco and Microsoft announcements are a sign that IPv6 is getting closer to being ready for production environments. IPv6 products are already available from Sun, Nortel Networks and 3Com.

"These are the two vendors that are absolutely critical to IPv6," says Jim Bound, co-chair of the IPv6 Forum's Technical Directorate and a principal See **IPv6**, page 120

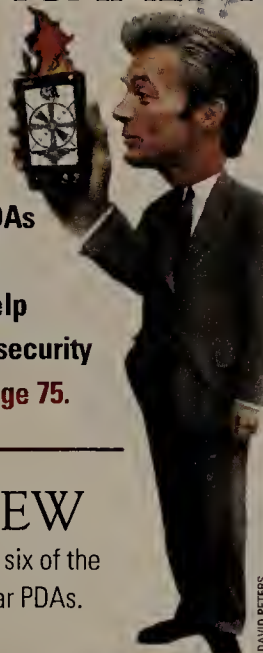


## THE PDA PRECIPITATION

The proliferation of user-owned PDAs is raising serious help desk and security issues. **Page 75.**

## REVIEW

Our take on six of the most popular PDAs. **Page 79.**



## Telco mergers may pain users

Service divestitures undermine one-stop shopping.

BY DAVID ROHDE

**WASHINGTON, D.C.** — Someday telecom mergers may achieve the long-elusive goal of one-stop shopping, but all they seem to be doing now is forcing users to deal with more carriers, not less.

Prior to completing its merger with US West, Qwest Communications last week announced it is selling its voice, private-line and fast-packet services in that RBOC's territory to regional carrier Touch America.

And *Network World* has learned that GTE has sent letters to thousands of voice and

data customers in the Northeast — home of its merger partner, Bell Atlantic — ordering them to find a new long-distance carrier by next week.

The reason for both moves: Federal regulations declare that once a carrier merges with a regional Bell operating company, it becomes an RBOC itself and can no longer carry traffic across local calling boundaries.

As a result, Qwest not only cannot merge, say, its frame relay service with US West's, but the company also has to find a third party to handle the frame traffic in US West's region. The See **Qwest**, page 118

## Alteon speeds up Web boxes

BY APRIL JACOBS

**SAN JOSE** — Companies running high-volume Web sites

**Nortel still trying to get Accelar 8600 switch out the door. Page 10.**

will soon be able to upgrade their Alteon Websystems switches so their sites can serve at least four times as many people at once.

The new switch software, which sources say will be announced next week, is also designed to save customers See **Alteon**, page 120

## Finding cash in bad bills

BY TIM GREENE



Remember that satellite office your company shut down six months ago, the one with T-1 access to headquarters? You canceled that T-1, so you no longer pay for it, right?

Maybe. Then again, it might still appear on your company's monthly phone bill, buried among a list of all the other services you buy, written in carrier hieroglyphics you don't really understand.

One way to find out for sure is by auditing your telecom bills, a reality check that can save you thousands or even hundreds of thousands of dollars. "It's like getting money from heaven," says Steven Kraemer, assistant director of

See **Audit**, page 115



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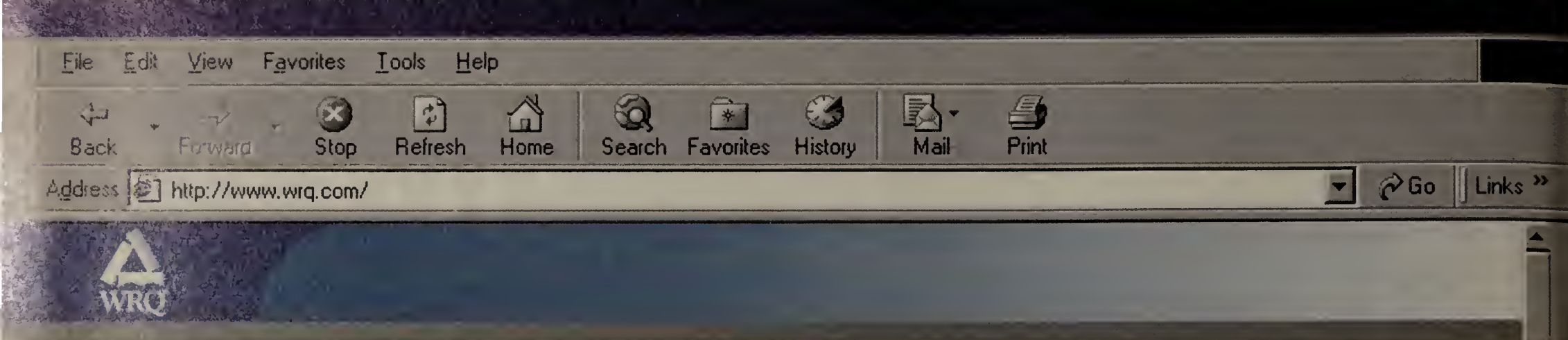
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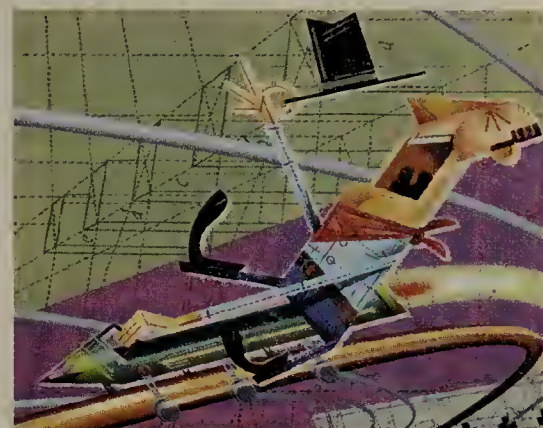
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# THE WIRELESS WEB

The wireless Web is coming — it's just a matter of how vendors overcome the limitations inherent in wireless devices. Page 81.

## THE COPPER ALTERNATIVE

New copper interfaces let you run Gigabit Ethernet over ordinary Cat 5 cable. Page 85.



Technical Feature: If you're planning to run Gigabit Ethernet, check out this throughput test using Windows 2000. Page 91.

Editorial: Sizing up voice over IP. Page 72

Paul Brusil: Common criteria for increasing confidence in security. Page 73.

Thomas Nolle: It's time to rethink the premises network. Page 73.

Backspin: How to play tech support bingo. Page 122.

'Net Buzz: Why online insurance makes sense... and "The Ozzie Watch" continues. Page 122.

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CONTACT US Network World, 118 Turnpike Road, Southborough, MA 01772; Phone: (508) 460-3333; Fax: (508) 490-6438; E-mail: nwnnews@nww.com;

CIRCULATION: Phone: (508) 490-6444; Fax: (508) 490-6400; E-mail: nwcirc@nww.com; STAFF: See the masthead on page 16 for more contact information. REPRINTS: (717) 399-1900



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## RESEARCH

### Spider Bytes: The Web's best tools and tips

- Who gets cheers and jeers for their mobility products? Mobile Insights, a portal for devices on the move, has news, polls and product indexes. Also, find the latest shareware offerings for small devices. **DocFinder: 7329**
- What happens when you build your enterprise network on ATM? Find out in a white paper from 3Com. From quality of service to its low cost per port, 3Com argues that ATM is the right choice. **DocFinder: 7330**

### Newsletters

From the **Linux** newsletter, **DocFinder: 7331**

"When people talk about a Linux box, what generally comes to mind is either a server or client machine running some distribution of Linux. [Users can] use Linux outside 'the box' with the Linux Router Project's distribution of the operating system."

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## FORUMS

"[Figuring out if ATM rules] will be pointless, as everything is going to be optical eventually. The market and technology will change, and ATM will be left behind. ATM works today for various scenarios, but the world is IP, not cells."

— From the "Why ATM rules" forum, **DocFinder: 7332**

### Other forum topics:

Bye-bye, NetWare 3.X

Novell is discontinuing sales of its popular operating system, but where does that leave users? Mourn its passing in our forum. **DocFinder: 7333**

## SEMINARS & EVENTS

### Making sense of directories

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### BARNEY'S RUBBLE

The best of the NetFlash daily newsletter

#### IBM leaps back into desktop fray

Speaking of IBM, the company that lost the PC operating system war — and then blew the PC hardware war — is back. The company last week unveiled a line of easier-to-use PCs, a batch of Internet appliances and an ultrathin new client. Wonder if any of them run OS/2, TopView, the Micro Channel or any of the many IBM desktop failures? **DocFinder: 7341**

#### Oxford English Dictionary defines online

When I heard that the Oxford English Dictionary was going online, I kinda yawned. But I sure woke up when I heard the price — \$550 per year for a subscription. Yikes. I wonder if I could convince my boss to buy me one? **DocFinder: 7342**

#### SEC alleges Internet insider-trading ring

A part-time word processor at Goldman Sachs found a unique way to pad his paycheck — he formed an insider trading ring over the Internet. The employee, John Freeman, I guess would be busy typing away on some top-secret document and then would e-mail his buddies with the tip. That wasn't enough for the greedy group, so Freeman also rifled through computers and peeked at documents left on copiers and printers. The group ultimately made more than \$8 million. **DocFinder: 7343**

#### Dell not threatened by small 'Net devices, CEO says

Listen to the hype and you'd think that Web phones, handhelds and all kinds of other crazy gadgets will be the death of the PC. Well, Michael Dell thinks all that is pure poppycock. For example, he says the screens on Web phones are too small. And small devices like the Palm are pretty much useless without a PC to feed them, Dell says. **DocFinder: 7344**

— Doug Barney, executive editor, news

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## COLUMNISTS

### In the Works

Encryption woes

NIST is considering replacing the Digital Encryption Standard with the Advanced Encryption Standard, and IT managers are on edge. But VPN Consortium Director Paul Hoffman says not to worry — he predicts a smooth transition. **DocFinder: 7334**

### Keeping Current

Your PSA PSA

Fred McClimans says using the Web for surfing and selling products is fine. But add Professional Service Automation Tools and you have a much better grip on the 'Net. **DocFinder: 7335**



### Help Desk

Hello, NT, this is a Mac

**Problem:** A user wants to connect a Mac to an NT server, but the server is not recognizing the username and password sequence.

**Solution:** Find out what Help Desk Editor Ron Nutter suggests. **DocFinder: 7336**



## NEWS BRIEFS, MARCH 20, 2000

### Cisco snaps up two more

Two privately held companies will join the fold at Cisco, following acquisition deals worth more than \$500 million in stock. Cisco announced this week it has reached an agreement to buy InfoGear Technology of Redwood City, Calif., for \$301 million worth of Cisco stock. Cisco also said it plans to buy JetCell of Menlo Park, Calif. InfoGear makes Internet appliances and software used to manage such devices. JetCell develops in-building wireless telephony products for corporate networks. Cisco will pay \$200 million in stock for JetCell, whose products, currently in trials, give enterprise customers' employees the ability to use a standard cellular phone to access their corporate voice system and roam from their private corporate network and the public cellular network.

### Is it R.I.P. for early ISP?

One of the first commercial ISPs, Agis, is also now among the first to file for bankruptcy protection. Late last month the Bethesda, Md., ISP filed under Chapter 11 rules. Agis shared the limelight as one of "the" ISPs with BBN Planet, MCI, Sprint, NetCom OnLine, ANS, PSINet and UUNET at the dawn of the Internet's commercialization. While most of these ISPs were acquired, PSINet and Agis were the only two that remained independent. CEO Phillip Lawlor says the ISP is reorganizing, but it's not clear what the future holds. Most experts believe Agis' remaining assets will be bought by another ISP.

### SAP forms B2B subsidiary

SAP, headquartered in Germany, has formed a new subsidiary, SAPMarkets, to develop technology and industry interest related to business-to-business trading exchanges on the Internet. SAPMarkets, to be based in Palo Alto, will consolidate SAP's previous efforts marketed as mySAP.com Marketplace. Hasso Plattner, co-chair and CEO of SAP, will serve as interim CEO of the new company until an executive is appointed to fill that role. SAPMarkets is expected to open for business in May.



**SAP CEO Plattner adds SAPMarkets CEO title for now.**

### Lenders to join hands online

Microsoft joined with mortgage lenders Freddie Mac, Chase Manhattan, Bank of America, GMAC Residential Funding and Norwest Mortgage last week to announce an online joint venture to provide mortgage loans. The venture, called HomeAdvisor

Technologies, intends to devise a way to automate credit checks, appraisals and underwriting, the processes involved in approving a home loan application.

### Video chat for your site?

White Pine Software last weekend announced a new software developers kit (SDK) that allows companies to add video chat to their Web sites that users can access via a standard browser. The Video Chat Your Site kit is based on White Pine's CU-SeeMe video-conferencing software and works with the company's MeetingPoint server on the back end. MeetingPoint allows multiple users to participate in the same conference. Pricing starts at \$24,000 for the SDK and a MeetingPoint server license. A revenue-sharing model is in place for distribution of the browser plug-in.



### DISA appoints new president

The Data Interchange Standards Association (DISA) in Alexandria, Va., has picked as its new organizational head Kerry Stackpole, president of the Electronic Messaging Association. Stackpole will step into his new position next month, replacing DISA interim acting president Jerry Connors, appointed after the departure last October of Judy Kilpatrick, DISA's former president and CEO. DISA, the organization that pioneered the U.S. versions of Electronic Data Interchange standards, has been struggling with defining its role in technologies such as XML.

### Big claims about tiny particles

Scientists from IBM Research laboratories have discovered chemical reactions that eventually could allow computer hard disks and other data-storage systems to store more than 100 times the data of current products, the company says. The chemical reaction causes tiny magnetic materials to automatically arrange themselves into well-ordered arrays, allowing for large data-storage possibilities. The reactions allow precise control over the size of each 'nanoparticle,' as well as the separate distance between them, according to IBM. The nanoparticles are about half the average size of the grains IBM used to store its record density of 35.3 billion bits per square inch in 1999. However, these new particles are also 10 times more uniform in size. The smaller size allows smaller data bits, and uniform particle size permits smaller data bits to be detected easily and accurately.

# Novell eases client installation, access

BY DENI CONNOR

**PROVO, UTAH** — Novell will show off two new products later this month that will make it less time-consuming for network managers to install NetWare clients on user workstations and easier for users to log on to the network, applications and Web sites.

The company will demonstrate a universal "smart client" and the next version of its Single Sign-on utility at BrainShare, its annual customer and developer conference in Salt Lake City, which runs from March 26-31. Single Sign-on is an application that eliminates the need for users to remember and enter multiple passwords as they log on to the network, Web sites and applications.

The smart client is a single piece of software for NetWare 5.X that replaces the various clients Novell requires to access the network. At present, Novell has four clients that allow end users with DOS, Windows 95/98/NT/2000, Linux and Macintosh workstations to log on.

"A smart client will simplify installation and maintenance in the sense that administrators will only have to carry one kit around, rather than several clients," says Dan Kuznetsky, an analyst for IDC in Framingham, Mass.

The smart client is more compact than present client software, requiring as little as 2M bytes on the client workstation instead of the 27M bytes needed by the current clients. The software contained in this 2M-byte package lets an end-user workstation log on to the network and search for required applications such as ZENworks, ConsoleOne or end-user applications that run specifically on NetWare. It automatically downloads modules from the server that the application needs to run. The smart client can be distributed remotely with Novell's automatic client utility or from within ZENworks.

"The smart client sounds like it may simplify client maintenance even further by eliminating the need for us to do each installation as a custom one," says David Meade, systems administrator for Lawton's Drug Stores in Dartmouth, Nova Scotia. "So long as we were able to see what is being installed and override any options that it chooses, we'd be interested in it."

Client installation takes anywhere from 1 to 20 minutes per workstation because problems occur that require special attention. "With every client upgrade I do, I have to troubleshoot many issues that cause problems," says Mikhail Sarkisov, PC/LAN support analyst with Amway in Grand Rapids, Mich.

"I use a batch file to partially automate client installation that has the required properties set," Sarkisov says. The smart client will automate client installation as well as eliminate the batch file.

The next version of Single Sign-on will incorporate technology from Passlogix, a maker of single sign-on products for Windows 95/98/NT/2000. It will let users log on and enter passwords once to access the network and applications, without the need to develop custom connectors or modify the application to accept automatic password entry. Passwords are stored in Novell

See **Novell**, page 118

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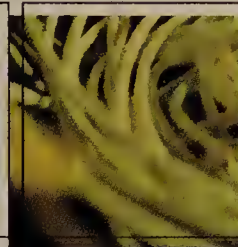
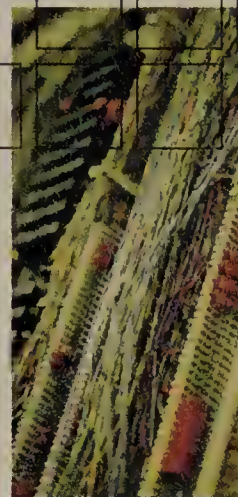
### This week's question:

What is the name of the new e-commerce joint venture formed by Microsoft and Andersen Consulting?

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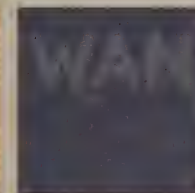
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# Nortel's Layer 3 switch still a moving target

*Delivery now slated for the second quarter; product reworked for additional markets.*

BY JIM DUFFY

SANTA CLARA — Users hoping to see Nortel Networks' next-generation Layer 3 backbone switch this month will have to wait a little longer because the company has delayed delivery again. . . . This time until the second quarter.

In what is becoming the saga of "The Switch That Never Was," Nortel's Accelar 8600 has run up against its fourth false start since it was announced 11 months ago. And it could be up to nine months late from the time it was supposed to ship — October 1999.

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Since then, Nortel has pushed the ship date to November 1999, March 2000, and now the second quarter.

Why? Nortel says it wanted to make sure the 8600 could serve the market for which it was initially designed — large enterprise core/backbone/data center environments — as well as emerging carrier-oriented

markets. These new target markets include ISPs, application service providers, optical switching, multitenant buildings in which landlords essentially act as ISPs and other more "esoteric" carrier applications, says Clive Foreman, a vice president in Nortel's Enterprise Solutions group, formerly Bay Networks.

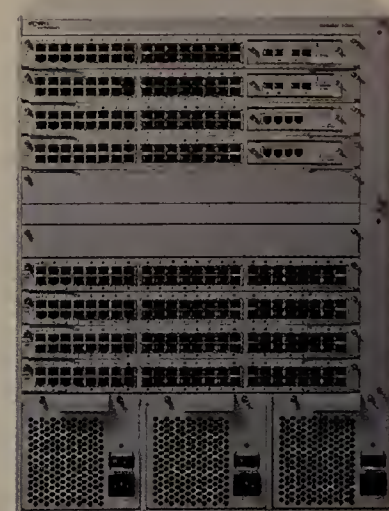
Also, Nortel is adding some enhanced look-up engines to the 8600 so it can process Wireless Access Protocol traffic and function as a back-end switch for wireless data infrastructures, says Bert Armijo, director of product manage-

ment for Enterprise Solutions.

"Those were things that were outside the scope of the original project," Armijo says. "But given the size of the opportunities, we didn't feel we could leave them lying alone."

The Nortel officials say they haven't missed any significant revenue opportunities by delaying the switch. That may be because the large enterprise market is growing at only about one-third the rate of the service provider and small/midsize enterprise businesses.

But Nortel did lose about 3% of its share of the Layer 3



**Nortel's Accelar 8600 may make its debut up to nine months later than initially planned.**

## Start-up eases database woes

BY DENI CONNOR

SEATTLE — The founders of load-balancing start-up Viathan would certainly agree that experience is the best teacher. In their case, it was the experience of struggling to keep databases up and running at Microsoft Network that convinced the two to launch their own company.

Viathan this summer will introduce a load-balancing device for back-end databases. Often companies involved in e-commerce load-balance their Web servers but forget about the databases in the background that feed e-commerce sites critical information for end-user transactions.

With as many as one million hits per day, these databases quickly fill up with shipping information, file storage and shoppers' personal preferences, says Steven Anderson, CEO for Viathan. When the databases go down, they require the attention of an administrator. A vicious cycle evolves in which administrators continually attempt to re-scale the back-end database servers each time more Internet data is added.

"At Microsoft Network, we were suffering the pain of trying to get our database data to scale to millions of users,"

Anderson says. "We were the ones who got paged at 2 a.m. when a database server went offline. We got tired of that and didn't find any products that solved the problem."

One user has high hopes for Viathan's product.

"Internet databases weren't designed for the Internet," says John Alberg, co-founder and head of Employease, a human resources application service provider in Atlanta. "In an Internet data center where you are supporting potentially hundreds of thousands of users, you need something that can scale and is fault-tolerant. Viathan is the only technology that has attempted that."

A hardware/software product code-named Leviathan is the company's answer for keeping databases up and operating. Built from off-the-shelf Intel servers, Leviathan software load-balances the traffic to and from database servers and clusters them for fault tolerance. In a typical configuration, the Leviathan server would sit between back-end database servers and a company's Web servers. Like the load-balancing device that fits between the Internet and the Web servers, Leviathan determines which servers can bear more traffic and which can't.

Database servers are elus-

tered over the local network. One server is able to take over for another in the event of overloading or a failure. Customers can add new servers as needed, and the cluster assimilates them in the most efficient manner possible.

"Viathan is virtualizing the database, and by doing so, it creates an effective, infinitely scalable, totally available back-end for Internet applications," says Steve Duplessie, an analyst with Enterprise Storage Group in Milford, Mass.

Leviathan will run on Windows NT servers. The company has plans to introduce Linux and Solaris versions by year-end. ▣

### PROFILE: VIATHAN

<b>Headquarters:</b>	Seattle
<b>Founded:</b>	February 1999
<b>Product:</b>	Load-balancing appliance, code-named Leviathan.
<b>Employees:</b>	20
<b>Founders' background:</b>	Microsoft, Motorola, IBM
<b>Funding:</b>	\$7 million from Arch Ventures and Madrona Investment Group.
<b>Fun fact:</b>	A companywide stair-running contest is held every Friday; record for 57 flights is 8 minutes.



**Viathan co-founders Chris Hickman, CTO (left) and Steven Anderson, CEO.**

Ethernet switch market in the fourth quarter of last year, Foreman says, citing data from The Dell'Oro Group. He adds, though, that Dell'Oro's numbers include Layer 3 "capable" switch ports in addition to pure Layer 3 devices.

Other analysts note that Nortel's enterprise share has been slipping, but the company could make up for that falloff and then some in the WAN and service provider markets.


"They have obviously been losing share, but it's important that they have these new features in order to be successful in some of these new areas," says Esmeralda Silva, an analyst at market research firm IDC in Framingham, Mass. "They are clearly moving the Accelar product beyond the enterprise and addressing more lucrative segments that they can get higher margins on."

Some users say the Accelar 8600 delay has not upset their Layer 3 deployment plans.

"Their time frame works fine for us," says Brian Teepell, senior network engineer at Reciprocal, a digital rights management company in Buffalo, N.Y. "We wouldn't be doing anything before the third quarter. We're still doing well with the [earlier-generation] Accelar 1200s."

Added Brett Frankenberger, systems engineer at Union Pacific Railroad in Omaha, Neb.: "It will be available by the time we have the money, and it will take a while to get our token-ring replaced." ▣





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# 'Net tax battle nears end as competing plans spar

BY SANDRA GITTLEN

DALLAS — A group of Internet powerhouses this week is battling against the clock to get approval for a proposal that would simplify sales tax procedures for goods sold over the Internet.

With two votes to go, America Online, AT&T, Gateway, MCI WorldCom, Charles Schwab and Time-Warner this week are lobbying fellow members of the Advisory Commission on Electronic Commerce (ACEC) to support their plan for reducing the complexity of collecting and remitting state taxes gathered by e-commerce ventures.

The commission, which was created in 1998, is due to appear before Congress next month to recommend how to proceed with Internet tax structures. The commission comprises federal, state and local government leaders, Internet business leaders and trade organization representatives.

So far, the Internet companies, which call themselves the Business Caucus, have the leading proposal, with 11 out of 19

commissioner votes. They need 13 votes to gain a two-thirds majority and to have their plan forwarded to Congress.

However, wary of gridlock, Congress will accept the plan as a recommendation with only 10 votes, according to Speaker of the House Dennis Hastert (R-Ill.).

The Business Caucus plan, which is not necessarily pro-tax, says that state and local governments need to simplify their tax laws before they ask companies to collect sales tax from online buyers.

Besides simplification, the plan calls for a five-year extension to the current ban on new

and discriminatory taxes for online transactions, a more detailed explanation of what constitutes a company having a physical presence in a state and uniform definitions and exemptions for product categories. It also proposes banning sales tax for physical counterparts to digitized goods such as software. (For more on what the commission is voting on, see graphic.)

"We support a plan that urges states to move forward with simplification," says a spokesman for AOL, whose president and chief operating officer, Robert Pittman, holds a seat on the commission.

But an extreme pro-tax group within the commission, led by Utah Gov. Michael Leavitt, says that if states agree to simplify their tax codes, then the states should have the power to make businesses pony up taxes. Currently, they have no national oversight and therefore have difficulty going after compa-

nies with operations in multiple states. The group holds four votes.

Yet another faction of the commission, led by Virginia Gov. James Gilmore had called for a ban on taxes on the 'Net, saying they would impede the growth of online businesses. But Gilmore and his group, which have five votes, have agreed to compromise and back the Business Caucus plan. Delna Jones, an Oregon County Commissioner, will also support the plan.

The final votes belong to commissioners appointed by the Clinton administration from the Federal Trade Commission,



Utah Gov. Michael Leavitt would like to tax e-commerce companies that operate in multiple states.

the Department of the Treasury and the Department of Commerce. While they could provide the swing votes necessary to push forward the Business Caucus plan, the three representatives have not committed their votes, according to a spokesman for Commissioner Joseph Guttentag at the Treasury Department.

Larger e-tailers such as Lands' End have already begun taxing goods based on the precedent set by catalog companies. They only collect and remit taxes for states where they have a physical presence, a concept also known as Nexus.

According to Charlotte LaComb, director of financial and investor relations, Lands' End has Nexus in five states where its main offices, distribution centers, call centers and outlet stores are located. She says, "I'm fine with the status quo."

But those Nexus lines can get blurry. Some Internet-based companies don't have large headquarters, but do have server farms and Web hosting centers scattered about the country. What constitutes a physical presence for them? "The courts or Congress do need to better define Nexus," LaComb says.

Although the Business Caucus plan calls on Congress and the courts to clearly define Nexus, it asks that the locations of a company's ISP, servers or telecommunications provider be exempt from Nexus rules.

The plan also urges state and local governments to develop uniform tax definitions and exemptions, according to commission member Stan Sokel, a representative from the Association for Interactive Media, a trade association for Internet businesses. For instance, Sokel says, in New Jersey if a consumer buys a scarf and uses it for warmth, the purchase is tax-exempt. But if the consumer uses it for decoration, it is taxable. "How's a seller based in North Dakota

See **Internet tax**, page 116

## Taxing situation in Dallas

Besides the Internet sales tax initiative, the Advisory Commission on Electronic Commerce will send these recommendations to Congress next month:

- Repeal a 3% federal sales tax on telecommunications.
- Extend the moratorium on new taxes on the 'Net, such as bit taxes, multiple taxes and discriminatory taxes.
- Do not tax Internet access.
- Conduct further studies on how to reduce the "digital divide."
- Collect more data on the impact of the Internet on brick-and-mortar businesses.

## Cisco seeks to kick-start IP Multicast

Company commits \$100 million in seed money, enhances IOS.

BY JIM DUFFY

SAN JOSE — Cisco this week will announce an IP Multicast initiative that includes a \$100 million investment to help kick-start the market.

Called "Internet Broadcast," the initiative includes the Internet Broadcast Market Fund, which will help Cisco and its partners develop and promote multicast products. The initiative also includes some Cisco IOS software enhancements to help deliver streaming content to desktops.

Such moves are needed to push IP Multicast forward, says David Schwartz, an analyst at market research firm Dataquest.

"Multicast has a lot of promise, but it hasn't taken off

yet," he says. "It's not priced right yet for the end user."

Nonetheless, Schwartz is impressed that Cisco will pony up that much money to help jump-start the market. "It's a strong dedication to help the market as a whole grow," he says.

The fund is designed to bring together software vendors, ISPs, systems integrators and application service providers, and give them early access to future multicast technologies for joint development. Cisco is also promising compatibility testing and co-marketing efforts with this investment.

To date, Cisco's Internet Broadcast partners include Hewlett-Packard, Digital Fountain, Tibco Software, the University of Oregon and

Whitebarn. HP and Cisco are developing multicast monitoring software for the HP OpenView management platform that performs accounting and security management for multicast environments, says Christine Falsetti, manager of IOS Technologies marketing at Cisco.

Cisco predicts a healthy increase in multicast products and services between 2001 and 2005.

On the product side, Cisco is releasing two enhancements for multicast efficiency and reliability.

Its Pragmatic General Multicast (PGM) technology is designed to enhance multicast reliability by enabling Cisco routers to send "negative acknowledgements" when

packets are not received, instead of when they are received. This enhances reliability because IP Multicast is based on User Datagram Protocol (UDP), in which no acknowledgments are returned to the sender. The new Cisco technology is also designed to free up WAN traffic by reducing the amount of acknowledgments.

The other new technology, dubbed URL Rendezvous Directory (URD), is a Cisco precursor to Version 3 of the Internet Group Multicast Protocol (IGMP). It enhances multicast efficiency by not requiring IGMPv3 to reside on end stations in a multicast group. URD resides on the last hop router in a multicast environment.

The new technologies will be included in the 12.0 release stream of Cisco IOS. PGM will ship this week, while URD will ship this summer.

Cisco: [www.cisco.com/ipmulticast](http://www.cisco.com/ipmulticast)



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# Supply-chain vendor i2 Technologies gains new links

*Merger with Aspect Development, purchase of Supplybase complement i2 product lineup.*

BY ELLEN MESSMER

DALLAS — Supply-chain software vendor i2 Technologies last week announced a merger with Aspect Development and the purchase of Supplybase, thereby locking up a pair of software specialists for negotiating with suppliers online. I2's goal is to challenge Oracle, SAP and Manugistics in this area of e-commerce.

Under the \$9.3 billion stock-swap with Aspect, which will become an i2 subsidiary, i2 gains exclusive control over technology that neatly complements its own supply-chain decision and management software. The deal is likely to be the largest in software history when officially concluded in several months. The i2 purchase of Supplybase is valued at \$380 million worth of i2 stock.

"Our own Product Lifecycle Management Suite does supply-chain logistics and planning," says Bruce Jacquemard, i2's senior vice president who pushed for the Aspect merger. "If you said you wanted to buy

6 tons of raw steel, for instance, we didn't have the supplier base to help tell you what you should use."

Aspect docs, however — about 180 corporate customers from the high-tech and industrial world are using the Aspect collaborative decision-support tools and electronic catalogs customized to meet specific needs. Newport News Shipbuilding, for instance, worked with IBM and Aspect to set up an Aspect-based electronic catalog at the shipbuilder's data center so engineers could search for parts online from over a dozen suppliers and order them directly.

"It's an extremely efficient way to search, and we have a link to our SAP R/3 system so we can show the inventory availability of the part to find out if it's in our yard at the time," says Steve Hassell, chief information officer at the shipbuilder. If the part is not on hand, the Web-based Aspect catalog offers a way to contact the supplier via e-mail, electronic data interchange (EDI) or fax to order it

or start the bidding or requisition process.

Aspect focuses on ordering standardized parts, but Supplybase, a start-up formed by three engineers from GE Plastics, specializes in online collaboration software for designing and purchasing custom-designed parts, such as injection-molded plastics or custom chips.

The software, called Supplybase.manager, runs on an NT or Solaris server behind a corporate firewall. "Anyone with a browser and e-mail can use it," says Dennis Stradford, Supplybase's president and CEO. Supplybase customers include Nortel Networks, Johnson & Johnson and Flextronics.

Supplybase.manager lets engineers view CAD/CAM files and mark up changes. In addition, if a corporation needs to locate a custom-work supplier, there's a database of 100,000 suppliers around the world in 47 industries to contact and start negotiations.

I2 Technologies, which entered into cooperative agreements with Aspect and

## B2B tech firms join forces

**Last week i2 Technologies said it will merge with Aspect Development in a deal worth \$9 billion and buy Supplybase for \$380 million.**

### i2 Technologies

**Headquarters:** Dallas,

**Main products/services:** Rhythm; Product Lifecycle Management Suite; TradeMatrix.com portal; Hightechmatrix.com portal

**1999 revenue:** \$571.5 million

### Aspect Development

**Headquarters:** Mountain View, Calif.

**Main products/services:** eCSM; Content Network

**1999 revenue:** \$95 million

### Supplybase

**Headquarters:** San Francisco

**Main product:** Supplybase.manager

**1999 revenue:** Privately-held company, owned 58% by employees and 42% by venture capital backers Red Rock Ventures and New Enterprise Associates (combined \$8.5 million investment), acknowledges unspecified losses to date.

Supplybase last autumn to ensure the three companies' products would work together, plans an integrated product line after the deals are complete.

Jacquemard acknowledges that the deals with Aspect and

Supplybase bring to a boil the company's simmering rivalry with supply-chain market rival Oracle.

Ironically, i2 and Oracle are expected to cooperate on building an online trading exchange for General Motors, Ford and Daimler-Chrysler under a deal announced last month by the automobile makers. Originally, the auto giants had planned competing exchanges, but they eventually decided to cooperate after auto suppliers complained it would be counterproductive to force them onto different systems to sell parts. "Well, we're waiting to see how things come together on that," Jacquemard says about the possibility of cooperating with Oracle.

The merger with Aspect calls for i2 to acquire all the outstanding stock and stock options of that company. Each Aspect share will be swapped at a ratio of .55 share of i2 common stock for each share of Aspect, taking into account Aspect's two for one stock split that became effective last week. Aspect will become a subsidiary of i2 with Romesh Wadhvani, Aspect chairman and CEO, becoming vice chairman of i2. ■

# TransScape ships Conquest for warehouse e-fulfillment

BY ELLEN MESSMER

BLOOMINGTON, MINN. — TransScape, a division of Pitney Bowes, last week began shipping Conquest, server software to manage order fulfillment and shipping in a business-to-business environment.

Intended for small and mid-size businesses, NT-based Conquest can accept incoming purchase orders over the Web, via e-mail or through an electronic data interchange network link. Conquest can determine which type of truck, air or rail shipment is best based on where ordered goods are warehoused and the cost to ship it to the buyer.

Conquest does this by checking a continually updated library of 179 carriers so



when a supplier decides to ship goods a certain way, the freight transport can be arranged online. When that's done, Conquest sends out a shipping notice as e-mail, fax or EDI to the organization ordering the goods.

The software, which starts at \$25,000 and runs to about \$100,000, can share this fulfillment data with back-end enterprise resource planning systems from Oracle, SAP, PeopleSoft, Baan and Primac. Both supplier and buyer can

obtain a Web-based view of the shipping status by logging on to Conquest.

InStep, a manufacturer of baby carriages and other equipment in Mendota, Minn., was an early adopter of Conquest for use in exchanging EDI-based purchase orders and shipping notices with JCPenney, WalMart, Sears and Target.

These retailers require suppliers to use EDI for order fulfillment, says Tim Gallagher, InStep chief financial officer. Since each chain uses EDI in slightly different ways, Conquest simplifies deployment of EDI — it comes with different software "kits" for each EDI partner, such as Kmart or WalMart.

"It's a good product for peo-

ple without big IT departments," says Gallagher, adding it was fairly easy to integrate Conquest into the manufacturer's warehouse management software, MAS 90.

"We'll get an EDI order from Target every week, and we have to ship within three days," Gallagher notes. "The Conquest server can send the EDI information directly on as a flat ASCII file to our warehouse in Au Claire, [Wisconsin]" Conquest also handles the printout of bar code labels.

Conquest represents the more modern rendition of an older TransScape product called Ascent, now used by about 15,000 companies, which lacked a Web-based view into its database. ■



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# Lotus moves replication beyond Notes

BY JOHN FONTANA

Lotus next month will release the first two of four components that will finally expose Notes replication to non-Notes clients and let those clients use Domino-based applications offline.

Lotus will release its Domino Offline Services (DOLS) tool kit and the corresponding Synchronization Manager April 15, company officials said last week. The two "plumbing" pieces are the first steps toward exposing replication to the world outside of Notes and Domino. Replication lets users bring data and applications logic down to their desktops, work offline as if they were connected to a server and then synchronize those changes back to the networked server.

Lotus later this year will release code to support replication in Microsoft Outlook, but the software, dubbed iNotes Access for Outlook, will only be released in beta form on April 15. The iNotes Web Access code also will go into beta test-

ing at that time. Lotus plans a midyear release of both iNotes clients which are built using the DOLS tool kit.

The DOLS tool kit lets developers build features into Domino-based applications that automatically generate chunks of code that are installed on non-Notes clients. The Synchronization Manager automatically installs the code — ActiveX controls or plug-ins — on those clients, most notably

Web browsers and Outlook.

Offline access to applications and replication have been the hallmark of Notes for years but are only available in the full Notes client. DOLS, while not a replacement for the Notes client, answers IT executives' pleas for Lotus to offer client options beyond the full Notes client.

"Replication has been the reason to give certain users the rich Notes client," says Gregg

Smith, senior software specialist for American Express Technologies in Phoenix. "Now we can provide that feature through a browser. The importance of not having the Notes client means we don't have to load it on every desktop and manage it."

Initially, Lotus will offer offline use and replication support for mail, calendar and task features for Outlook and Web browsers. The support in iNotes Web Access will also allow offline use of Domino applications enabled with DOLS.

"This makes Notes more universal," says Jonathan Spira, an analyst with the Basex Group, a New York consulting firm. "DOLS has tremendous implications for mobile users."

In order to support DOLS, Lotus has to deliver the long-promised 5.03 upgrade to Domino, which provides such features as calendar and printing enhancements. DOLS is only supported on Domino 5.03 and runs on Win32 platforms. An OS/2 version is planned later this year. ■

## Take it offline

**Lotus is set to release its anticipated Domino Offline Services (DOLS), which lets non-Notes clients use Domino-based applications offline and then replicate changes to a server.**

Product	Features
<b>DOLS tool kit</b>	Lets corporate developers and ISVs DOLS-enable applications.
<b>iNotes Access for Outlook</b>	Allows Domino's mail, calendar and task features to be used offline before being synchronized with a server.
<b>iNotes Web Access</b>	Adds offline access to DOLS-enabled applications and includes the same functions as Microsoft Outlook.
<b>Synchronization Manager</b>	Features the mechanism used to push DOLS code onto clients.

# Wireless service providers need speed

BY DENISE PAPPALARDO

Accessing the Internet using a wireless handheld device offers exactly the same performance you would get sitting at your desktop ... back in 1993, that is.

To bring wireless networks up to speed, the leading U.S. service providers are planning major network upgrades. Carriers such as Sprint PCS, AT&T Wireless, GTE Wireless and Bell Atlantic Mobile have plans to make their networks faster, broader and more reliable, although some of the improvements are years away.

Today, wireless network transmission speeds are maxing out at between 14.4K bit/sec and 19.2K bit/sec, depending on the underlying network technology. And those speeds are just too painful for e-mail users and Web surfers

typically not willing to put up with anything below 56K bit/sec.

Carriers are looking to upgrade their networks to what are called third-generation (3G) wireless infrastructures — those that can support speeds more than 100 times as fast as those supported today. The carriers claim business users can expect speeds ranging from 384K bit/sec up to 2M bit/sec. And with the use of wideband Code Division Multiple Access (CDMA) technology by some carriers, the size of channels between end users and base stations will balloon from 30 kHz to 5 MHz.

Business users will see capacity and speed upgrades as early as this year, but 3G services are three to five years off, says Bob Egan, research director at Gartner Group, a Stamford, Conn., consulting firm.

Sprint PCS has been offering customers its Wireless Web service since September over a circuit-switched network at 14.4K bit/sec. But Sprint PCS customers can expect a boost to 56K bit/sec by year-end, says Oliver Valente, a vice president at the company. The upgrade is not based on any of the pre-3G or full 3G standards, he says.

But Sprint PCS' plan to increase network access to 144K bit/sec is based on a pre-3G specification called 3G1X, Valente says. "We will be going to 3G1X in the second half of 2001, which will increase speeds, but also improve battery performance and increase capacity from a voice standpoint on our network," he says. Sprint PCS' network is based on CDMA in the 1,900-MHz spectrum band.

This upgrade means deploying new cards at transceivers

and receivers throughout Sprint PCS' network and allows the carrier to move from a circuit-to packet-based network.

"This is an important development," Gartner's Egan says. Packet-based networks are more efficient than circuit-switched nets in that they enable carriers to charge users only for the data traffic being transmitted. In addition, carriers can increase capacity on packet networks without increasing spectrum, he says.

Observers say all major wireless carriers will move from circuit- to packet-switched networks over the next few years.

In addition to upgrading its network, Sprint PCS later this year plans to offer new services for businesses that will allow mobile users to access corporate applications via their wireless handsets, Valente says. "Customers will be able to link up to corporate intranets, access e-mail and calendar applications," he says.

Officials at AT&T Wireless say their current combination of

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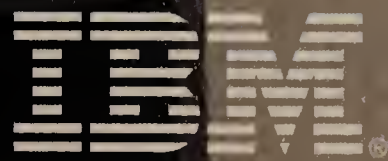
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# Microsoft directory tool has limits

BY JOHN FONTANA

Microsoft has released a promised directory migration tool, but large companies will need something extra to complete the move to Active Directory in Windows 2000.

The Active Directory Migration Tool (ADMT) is a wizard-driven tool that migrates users, groups and resources from Windows 3.51 and NT 4.0 to Active Directory. While Microsoft says the free tool will appeal to the majority of customers, the company defines those customers as having a small number of NT 4.0 domains and a simple network infrastructure.

Large enterprises have seen their NT 4.0 domains grow bloated and sloppy over the years, and will want to clean out the clutter in those domains and collapse them into fewer domains before migrating, experts say.

Those customers also are likely to migrate user data into Active Directory

## Active Directory tool lacking

**Microsoft has released its Active Directory Migration Tool (ADMT), but some companies may find the tool lacking. Here is a look at the target customer for ADMT and third-party tools.**

Tool	Target users	Features
ADMT	Users who want to migrate to Windows 2000 from simple NT configurations with a few domains.	Wizard-driven migration of users, groups, computers and service accounts. Microsoft offers the tool for free.
Various products from Aelita, Entevo, FastLane, Mission Critical	Customers with complex NT 4.0 domain structures that need to be cleaned up and restructured, and multiple offices.	Third-party tools add advanced features for creating test environments, rolling back changes, and cleaning up and collapsing domains.

from other systems, such as human resources and payroll databases or other directories, and will want to create model environments to test their directory structures before going live. All those needs will require third-party tools from such vendors as Aelita, Entevo, FastLane and Mission Critical Software.

"ADMT is a bulk tool without a lot

of controls," says a systems engineer with a multinational corporation who requested anonymity. "There is no way to do the testing and consolidation you need before migrating."

Others have turned to ADMT only after using other tools.

"I wrote my own tool to do modeling routines for the directory," says Eric Craig, network architect for Continental Airlines. "We then used ADMT and ClonePrincipal as we moved users and groups." ClonePrincipal is a feature of ADMT that allows NT 4.0's secure IDs, or SIDS, to be appended to user records

in Active Directory so those users can still access resources in NT 4.0 domains that are active during a migration.

Microsoft makes no bones about the limitations of ADMT, although it contends it will fit the needs of 75% of users.

Some of the limitations of ADMT include the need to upgrade every NT 4.0 domain controller within an individual domain at once. Users must do that to support ClonePrincipal so they can maintain access to NT 4.0-based domains that have yet to be upgraded. Users also will have to migrate any applications in the upgraded domains to Win 2000. Users also can't do NT 4.0-to-NT 4.0 domain migrations as a way to restructure domains.

"ADMT assumes you will completely migrate to Win 2000," says Olivier Thierry, vice president of product management for Mission Critical, which licensed the base code for ADMT to Microsoft. "There is no content sanity-check before you migrate, you don't do anything intelligent with the data. Users will want to clean up their naming structures and orphan accounts before they move, not after." ■

## Directories

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# Streaming media war heats up

BY JASON MESERVE

The battle for streaming media supremacy escalated last week as Microsoft announced that rival RealNetworks is licensing its Windows Media software developers kit (SDK).

Microsoft claims this makes the Windows Media format the de facto standard for digital audio on the Web, surpassing RealNetworks' RealMedia format. Microsoft and RealNetworks offer software on both the client and server sides for digital media over the Internet, and each has its own format for delivering content.

"There will now be a universal format for digital audio on the Web," says Will Poole, general manager of Microsoft's digital media division. Based on research by Media Metrix, Poole also says Microsoft edged out RealNetworks in terms of reach to U.S. households in December. That research encompassed all versions of the Windows Media Player, including the less robust versions shipped with Windows 95.

But RealNetworks downplayed the Microsoft announcement, saying it

only licensed the Windows Media SDK for its RealJukebox product, which allows users to collect, manage and listen to Web-based music. The company does not have plans to implement support for the Windows Media format in RealPlayer client software, says Rob Grady, a RealNetworks product manager.

"Nothing in this announcement affects the tools, players or servers that we offer to our customers," Grady says.

Both companies say they are leading the battle of the player, with Microsoft claiming more than 100 million installed and RealNetworks saying it has more than 95 million unique registered users. Both give versions of their player away free, although Microsoft has a slight advantage because its player comes bundled with the Windows operating system.

RealNetworks also announced last week that it will add support in the RealPlayer 7 client for Net2-Phone's Internet telephony product. This will allow users to make Internet phone calls directly through RealPlayer. ■

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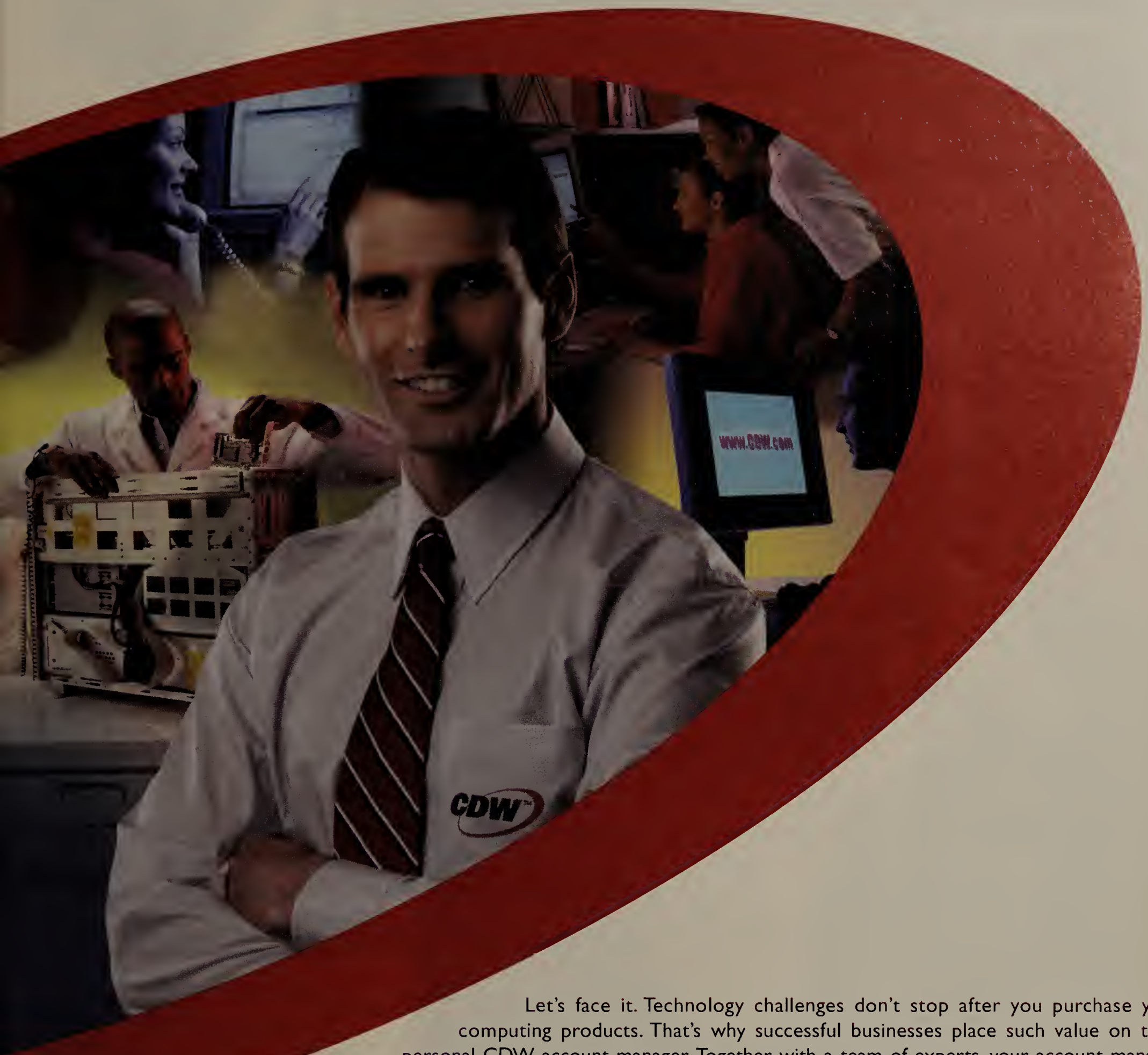
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# Infrastructure

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## Briefs

**Brocade** last week introduced a switch module that provides remote access to SANs over Wan links.

The Remote Switch is add-on software for Brocade's SilkWorm 2000 Fibre Channel switch. With Remote Switch, users can join SANs across long distances at T-1, T-3 or ATM OC-3 speeds.

Remote Switch might be used for business continuance operations such as remote mirroring or tape vaulting.

The SilkWorm 2000 family of switches includes devices for Fibre Channel arbitrated loop and switch fabric environments.

Remote Switch is available now.

Brocade: [www.brocade.com](http://www.brocade.com)

In what is becoming an industrywide trend, **Nortel Networks** is the latest company to spin off a piece of its enterprise network business that is either low-growth or not core to the company's mission.

In Nortel's case, it's the latter. To little surprise, the telecom giant has established its former Netgear small office/home office (SOHO) network products subsidiary as a separate company.

Netgear, established in 1996 as Bay Networks' counter to 3Com's OfficeConnect and Cisco's failed CiscoPro retail and mail order SOHO product strategies, was almost immediately identified by observers as a part of Bay Networks that Nortel was least committed to and most likely to divest.

Netgear has received a \$15 million equity financing investment from Pequot Capital Management. Nortel has named Patrick Lo CEO of Netgear.

## Watch TV, transfer files simultaneously

BY JASON MESERVE

It might not be long before "Who Wants To Be A Millionaire" and your company's inventory updates are flowing across the same airwaves. New technology is being developed that will allow files to be mass broadcast to multiple locations using the digital TV (DTV) broadcast spectrum alongside a regular television broadcast.

The Federal Communications Commission has mandated that all of the nearly 1,600 broadcasters in the U.S. convert to a digital signal by 2006. Each

station has been given a 19.4M bit/sec spectrum on which to broadcast, but no financial incentive to convert — just a mandate. To make up for the cost of converting and to add new revenue streams, DTV broadcasters are looking into ways of embedding IP data into their digital broadcast signals.

A consortium of 12 major broadcasters formed iBlast Networks, which is devoted to providing digital content over DTV broadcast signals. Each of the iBlast partners will dedicate part of its local TV spectrum to content such as music, videos, games and software. Though iBlast

targets the consumer market, enterprises may be able to take advantage of this ambient bandwidth in the near future.

"The television stations will be sitting on bandwidth," says Martin Hall, chief technology officer of Stardust Forums. "If you IP-enable that bandwidth, you can become a de facto ISP."

At the Stardust Forums MCAST 2000 Summit last month in San Francisco, vendors demonstrated some of the many uses of IP Multicast technology in the show's "Splash II" project. Part of Splash II involved KNTV in San Jose embedding MPEG1 video into its DTV broadcast, which was received, via an antenna on the roof of the hotel, by a standard PC at the show. The near-TV quality video was broadcast at 700K bit/sec and viewed with RealPlayer G2 from RealNetworks.

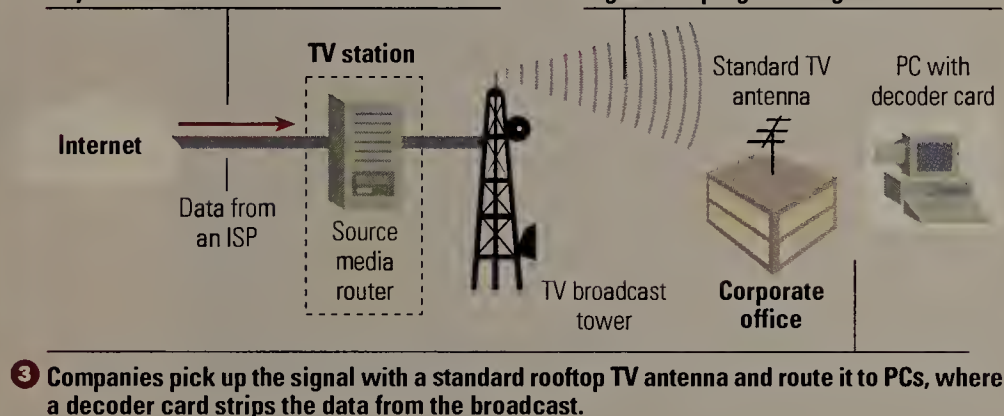
Behind the scenes, the technology is relatively simple. Data coming into the television station is encapsulated into a DTV signal using a media router device such as those from SkyStream Networks and Logic Innovations. The signal is broadcast over the airwaves and received by a standard antenna on top of a building or house. A wire runs from the antenna to a decoder card installed in the PC that converts the signal into usable form. The data is sent using IP Multicast technology.

Given that today's analog television  
See **Digital TV**, page 32

### IP over digital TV: How it works

1 IP data (files, audio or video) is encapsulated into a standard digital TV broadcast by a television station using a device such as SkyStream's DBN-24 source media router.

2 The signal is sent over the airwaves. Each station has a 19.4M bit/sec spectrum that can be used simultaneously for regular TV programming and data.



3 Companies pick up the signal with a standard rooftop TV antenna and route it to PCs, where a decoder card strips the data from the broadcast.

## NetWare 3.2 users mull options

*Some vow to stick with Novell, others eyeing Windows, Linux.*

BY DENI CONNOR

**PROVO, UTAH** — NetWare users are reacting to Novell's decision to discontinue sales of NetWare 3.2 with surprising calm.

The company is expected to announce this week that sales of NetWare 3.2 will stop in October. NetWare 3.x, which first shipped in 1989, is the last version of Novell's network operating system that uses a flat-file database manager, called the bindery, and is managed with a series of DOS-based utilities.

Still, as many as 30% of NetWare customers use this 11-year-old operating system, Novell claims.

While Novell has no plans to suspend NetWare 3.2 support for the foreseeable future, it will offer unspecified incentives to get users to migrate to NetWare 4 or 5.

More than half of the nearly two dozen NetWare 3.2 users contacted by *Network World* for this story were small or midsize businesses, most of which will either stay with NetWare 3.2 or migrate to a newer release. Several users say they are trapped by legacy applications that don't work on NetWare 4 or 5, but can operate on Windows NT.

"I have to stay with NetWare 3 until we upgrade our billing application," says Pete McCaslin, WAN administrator

for Alaska Communications Systems in Anchorage. "I have been preparing for something like this for some time now — it is going to be a smooth transition to Windows NT."

"We will stay with NetWare 3.2 and cross our fingers or migrate to NT," says Charles Hagebusch, technical support  
See **NetWare**, page 24

[www.nwfusion.com](http://www.nwfusion.com)

## BYE-BYE, NETWARE 3.x

Novell is discontinuing sales of its popular operating system, but will its ease of use be missed? Log on to our forum to find out.

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# Microsoft, Andersen unite on consulting venture

*Avanade to focus on getting Windows 2000-based electronic commerce sites up fast.*

BY JOHN FONTANA

REDMOND, WASH. — Microsoft last week made its most significant leap into the consulting services business by forming a \$1 billion joint venture with Andersen Consulting designed to help enterprise customers build e-commerce systems on Windows 2000.

In addition to creating the new venture, dubbed Avanade, the partners will create a 3,000-employee business unit within Andersen called the Microsoft Solutions Organization. The unit will be

dedicated to designing industry-specific and cross-industry e-commerce systems.

In essence, Andersen will help enterprise customers develop their e-commerce systems, while Avanade will build the platforms, applications and integration services to make the systems work. Microsoft and Andersen emphasize that the focus will be helping customers quickly get e-commerce systems up and running.

"This is a very significant partnership in the enterprise space for Microsoft," says Dwight Davis, an analyst with

Summit Strategies in Kirkland, Wash. "This is the old-line world of consulting where Microsoft has not had a focus. Andersen Consulting is a first among equals in this space."

Microsoft CEO Steve Ballmer called the partnership unique for his firm. "When it is time to do a big job, if you are IBM or Oracle today, you say, 'I am going to put all my people on it, I'll do that implementation for you, Mr. Customer.' That is not our core competency — we want it to be," he says.

Ballmer says he is frequent-

ly asked how Microsoft plans to get into the enterprise, and says he now has a good answer.

"With the creation of Avanade, people are saying, 'Are you going to have skin in the game?' Well, we got skin," Ballmer says. "Andersen can build the solution, and Avanade has the skin to make sure that thing gets appropriately implemented and operated."

Avanade plans to focus on reusable e-commerce applications, Windows application development and integration, high-availability enterprise and Web infrastructures, and data-center consulting services. The creation of Avanade, which hopes to hire 3,000 Microsoft experts over the next two years, is subject to regulatory approval, the partners say.

As part of the \$1 billion deal, Microsoft will contribute \$385 million to support Avanade, and application development support and other intellectual capital. Andersen will provide intellectual capital, training, resources, solutions development and other services.

## Transformation plan

The move is part of Microsoft's plan to transform itself into a firm that delivers software as part of a service available over the 'Net (its so-called Next Generation Windows Services), as opposed to just shrink-wrapped applications.

"It's a part of how we take Windows 2000, Windows 2000 Data Center and the Next Generation Windows Services on up into the e-commerce world," Ballmer says.

Some 25,000 Andersen staff will be trained on



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**"[Avanade is] a part of how we take Windows 2000, Windows 2000 Data Center and the Next Generation Windows Services and take them into the e-commerce world."**

Steve Ballmer, CEO, Microsoft

Windows 2000, SQL Server, Exchange Server, e-commerce technologies, Windows DNA 2000 and Visual Studio development system-based tools. Microsoft and Andersen also will develop horizontal and vertical applications based on products from vendors such as Commerce One and PeopleSoft.

Mitchell Hill, a 20-year Andersen partner, will be Avanade's CEO. Besides its Seattle location, Avanade plans to open offices in San Francisco, Dallas, Chicago, New York, London, Frankfurt, Sydney, Paris, Sao Paulo and Singapore in the next 18 months. Plans also call for taking Avanade public at some time.

The Microsoft Solutions Organization within Andersen will be headed by Karl Newkirk, a senior Andersen partner and former global managing partner for the firm's Enterprise Business Solutions business. ■

NetWare,  
continued from page 21

coordinator at IT outsourcer Lason in New Orleans. "Our applications have issues with NetWare 4 and 5." Lason has 140 NetWare 3.2 servers.

While these users will end up migrating to NT, many NetWare 3.2 users are loyal to Novell. They'll stay with NetWare 3.2 and hope nothing goes wrong. Or if it does, migrate to NetWare 4 or 5.

"Every network expert I talk to still believes that NetWare 3.2 could be one of the best programs ever made because of its simplicity. It still works after many years and with many operating systems," says Paul Harvey, IT manager at Habitat for Humanity in Waterloo, Ontario. "Most of all, NetWare 3.2 needs very little maintenance."

## Paying the price

Some users can still afford the costs associated with upgrading their network operating systems, such as the more powerful hardware required by NetWare 4 or 5. Their major concern is that vendor support for NetWare 3 has waned and will become more difficult to get over time. More technicians are trained to support newer NOS versions, such as NetWare 4/5 or Windows NT/2000.

"My budget proposal for NetWare 5 was rejected," says

Dave Woolcock, IT director for an accounting firm in Preston, U.K. "We just bought two new servers, and the drivers and instructions supplied with them are wrong and out-of-date. It takes several days to get them running satisfactorily under NetWare 3."

"I don't know many people with NetWare 5 experience I can call on," Harvey says. "This area is seriously Windows NT country, and right now I won't even consider Windows 2000."

"Although we do use several NetWare 3.x servers, I have found that because of the software's age, there are many issues relating to integrating

new hardware with the operating system," says Stuart Cash, senior IT assistant for Celtic Energy Limited in South Wales, U.K. "As a consequence, any new servers I bring into the company are biased toward Windows NT 4.0."

All those users would like less-expensive upgrades to NetWare 5 than previously offered, help migrating from the bindery to Novell Directory Services or other incentives.

Novell has not commented yet on the incentives it will offer to encourage customers to migrate from NetWare 3 to its newer NOSes. ■

## NetWare 3.x users speak out

• "I think 30% is a big number of users. That should tell you that customers still like Novell 3.2, or they would have gotten rid of it long ago."

**Paul Harvey, IT manager, Habitat for Humanity, Waterloo, Ontario**

• "In addition to Windows NT, we're considering Linux as a NetWare replacement. We already have a fair amount of Linux experience, and it would be simpler to implement than NetWare 5."

**Ken Long, network manager, Lectrosanics, Rio Rancho, N.M.**

• "The hardware will die before the NOS does because the small business environment is stable. When the hardware finally dies, we'll probably migrate to Windows 2000 or Linux."

**Jeff McMillan, network consultant, Olympia, Wash.**

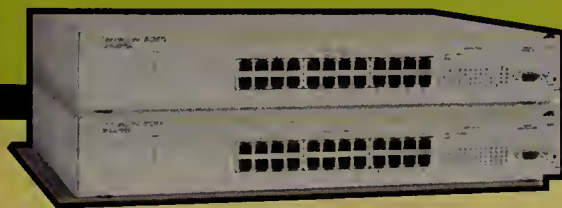
• "We will continue to use NT and 2000 where they make sense — for application and database servers. We'll use NetWare for file and print or directory services."

**John Garcia, network engineer, DeVry, Columbus, Ohio**



**Novell is discontinuing its NetWare 3.x product line.**





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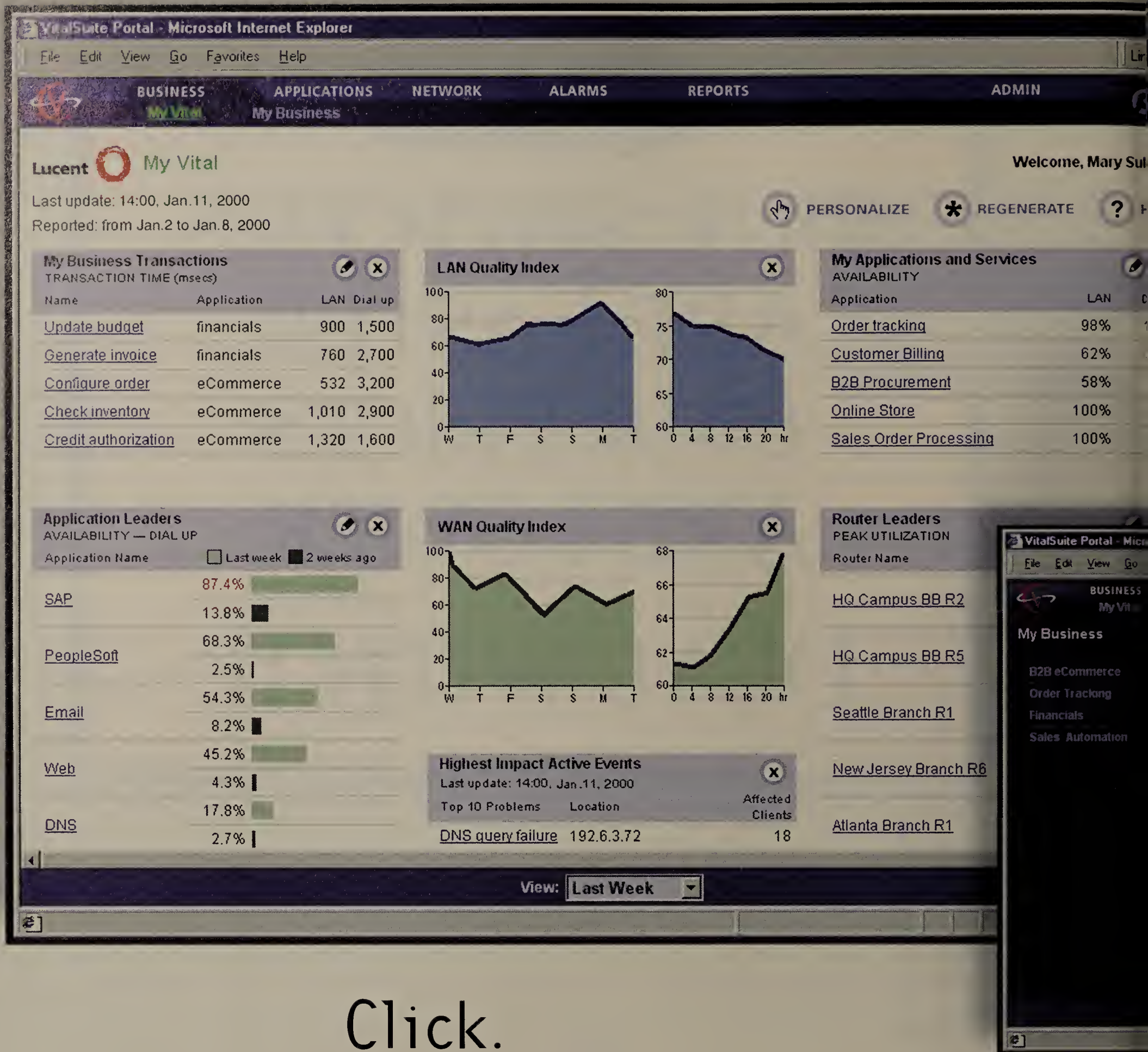
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# IBM adds muscle to storage network line

BY MARC SONGINI

SOMERS, N.Y. — While all Windows 2000 servers might look pretty much

the same, IBM is attempting to differentiate its latest machines by delivering a complementary collection of storage-area network (SAN) products.

In addition to delivering the Netfinity 7100 and 7600, a pair of four-processor PC servers, IBM next month will introduce products that enable companies to

zip information into and out of storage devices more quickly and to better manage networked storage resources.

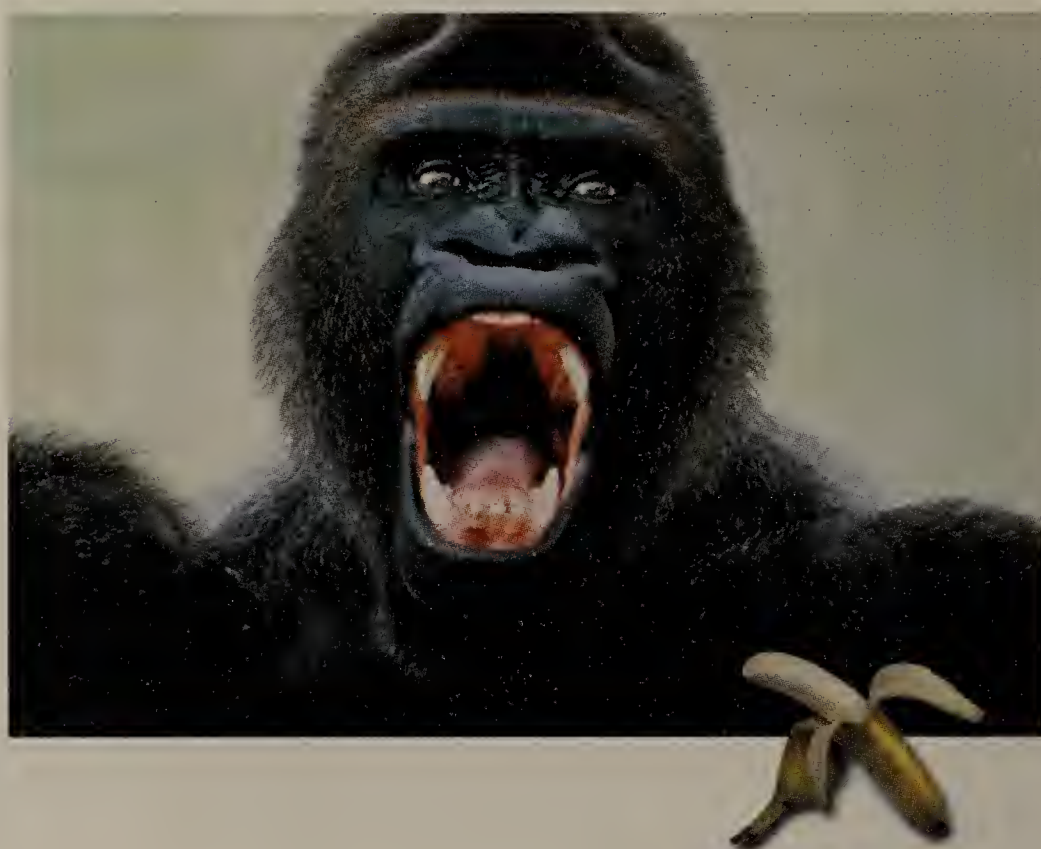
IBM thinks it can turn the heads of Compaq and Data General SAN customers with its new line of FastT500 SAN hardware and software. For instance, the new Netfinity FastT500 RAID Controller Unit can handle data at up to 300M bit/sec, higher than the current standard of 100M bit/sec. The RAID Controller attaches to a group of storage devices and manages the flow of traffic in and out of them.

The controller can manage up to 220 disk drives (up to 8 terabytes of storage capacity) among a group of storage devices, up from the current capacity of about 60 drives. It costs \$36,570.

Also new is the Netfinity Fibre Channel Storage Manager Partition Enhancement 1.0, which works with the controller to divvy up disk space on storage devices among different servers, applications and users. This Java tool is

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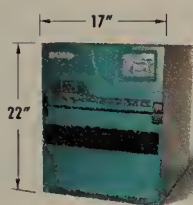


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IBM is complementing its Netfinity 7100 server with SAN products.

an add-on to IBM's Netfinity Fibre Channel Storage Manager software.

The \$7,400 software can be used to give up to eight different hosts dedicated partitions on one storage device, rather than giving them each their own storage device.

This sounds intriguing to Chris Bond, president of Frantic Films, a Winnipeg, Manitoba, firm that uses four Netfinity servers to create digital special effects and computer graphics. He is interested in assigning users disk partitions for data storage in the initial stages of a project, then assign those parts of the disk to other users later during the project.

IBM also is announcing the Netfinity FastT Host Adapter Card, which fits in a Netfinity box. The card runs Fibre Channel traffic; it can also wrap IP packets inside Fibre Channel frames. This means that in the future, users will be able to run IP inside Fibre Channel at up to 300M bit/sec, IBM says. The card costs just under \$1,500.

The new servers, the 7100 and 7600, cost \$7,000 and \$9,940, respectively.

IBM: [www.pc.ibm.com/netfinity](http://www.pc.ibm.com/netfinity)

**For more on SANs, see Technology Update. Page 69.**

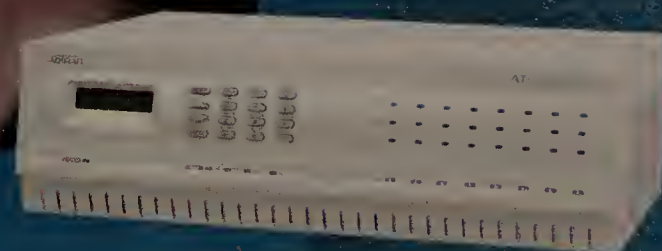


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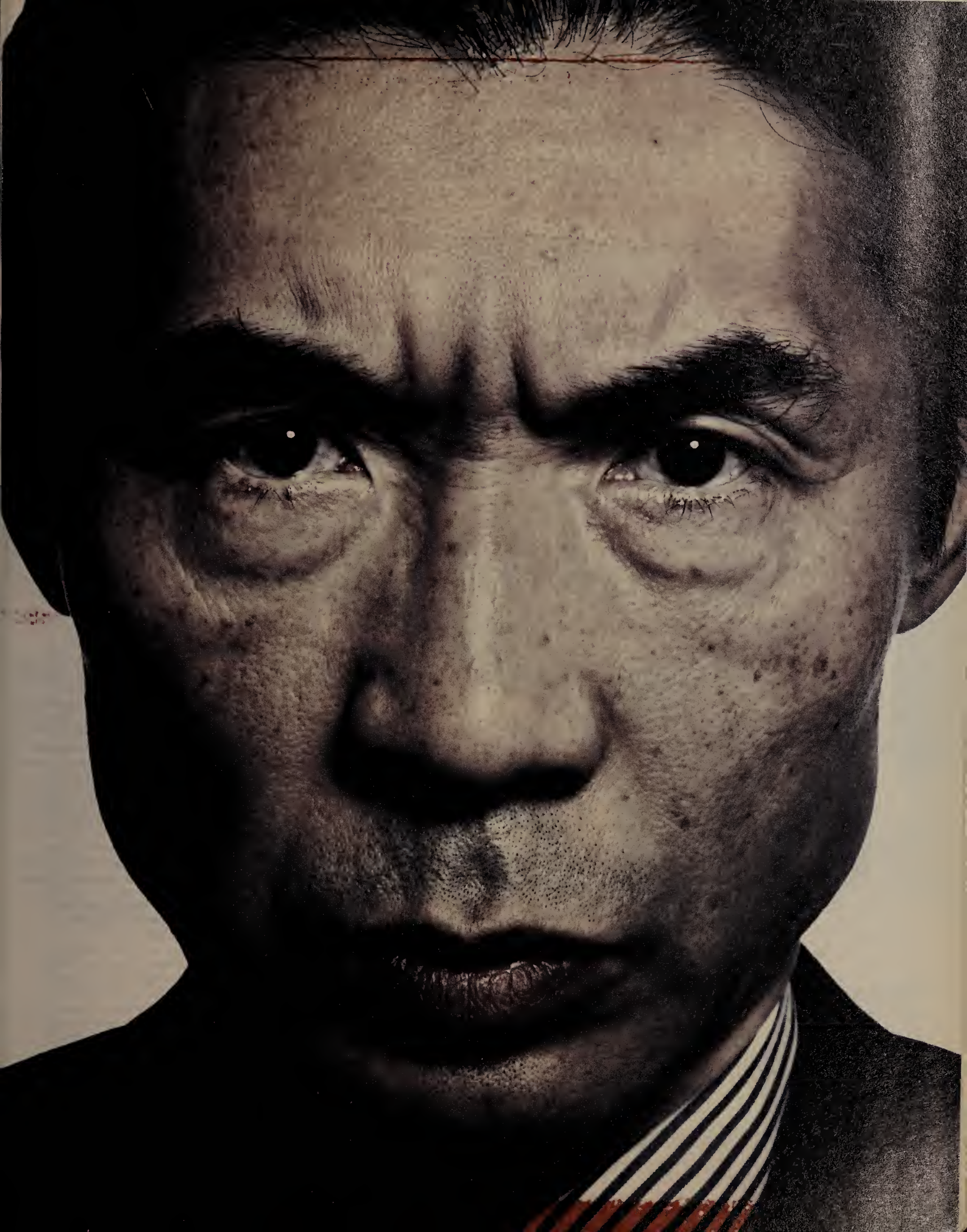
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**Digital TV,**  
continued from page 21

uses about 4M bit/sec for its transmission and high-definition DTV uses around 16M bit/sec of bandwidth, there are still a few megabytes of space left for transmitting other content. In

the case of the KNTV demonstration at MCAST, the broadcaster was using 16M bit/sec for its regular programming and around 1M bit/sec for the MPEG1 stream, says Molly Glover, director of new media development at Granite Broadcasting, KNTV's parent company.

Glover says her company is still in

the very early phases of testing this technology. "We have done some experimenting," she says. "We're trying to get the word out that this is an asset that broadcasters have and need to understand."

"Are television broadcasters going to broadcast 19.4 megabits 24-7? It's not

going to happen," says Clint Chao, vice president of marketing at SkyStream Networks in Mountain View, Calif. "This leaves the remaining bandwidth for insertion of other types of content."

For corporations, this could be a relatively inexpensive means of transmitting large data files to remote offices in a given region. Companies could contract with a broadcaster to use the bandwidth overnight if the TV station is off the air. Instead of running leased lines or other high-bandwidth landline connections to satellite offices, companies could just set up antennas on the roof and have their satellite offices receive the latest pricing or inventory information over the airwaves.

■ **"The television stations will be sitting on bandwidth. . . . If you IP-enable that bandwidth, you can become a de facto ISP."**

Martin Hall, chief technology officer, Stardust Forums

"This is great for file transfer or any package delivery where it does not have to be in real time," says Fred Kokaska, product manager at Logic Innovations, one of the companies that makes equipment for encapsulating IP data in a broadcast signal. "Inventory lists or anything like that can be played out and received at all sites at the same time."

Some of the problems with embedding IP data in DTV signals include the limited reach of a given broadcaster and the fact that the communication is one-way. With IP Multicast technology (which is used to transport the signal simultaneously to all recipients) a two-way connection is needed to guarantee reliability, though the technology is designed to support one-way communication between source and target.

There are only a limited number of television stations that have begun broadcasting a digital signal. It will be a while before every market is served by DTV. Broadcasters would also have to add server and incoming data capacity in order to act as an ISP, which could take additional time and money.

Glover says Granite is doing as much experimentation as possible to identify which applications would work best in the broadcast environment. "We're hoping to do a bigger test with consumers in the third or fourth quarter," she says. "It will be more of a test than a service rollout, though." ■

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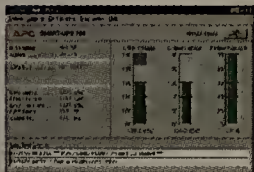


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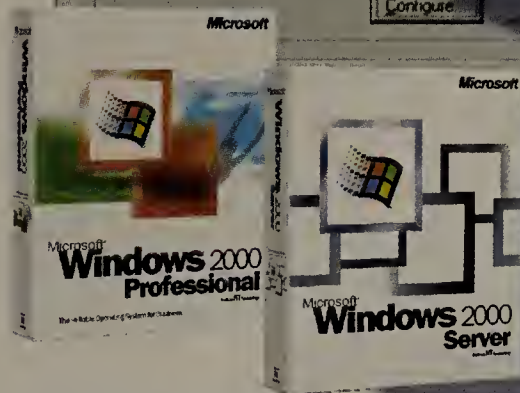
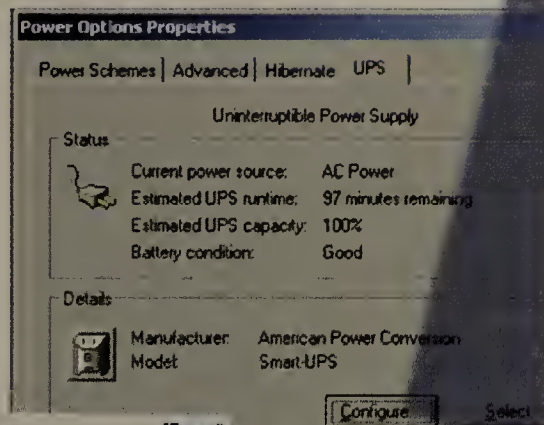
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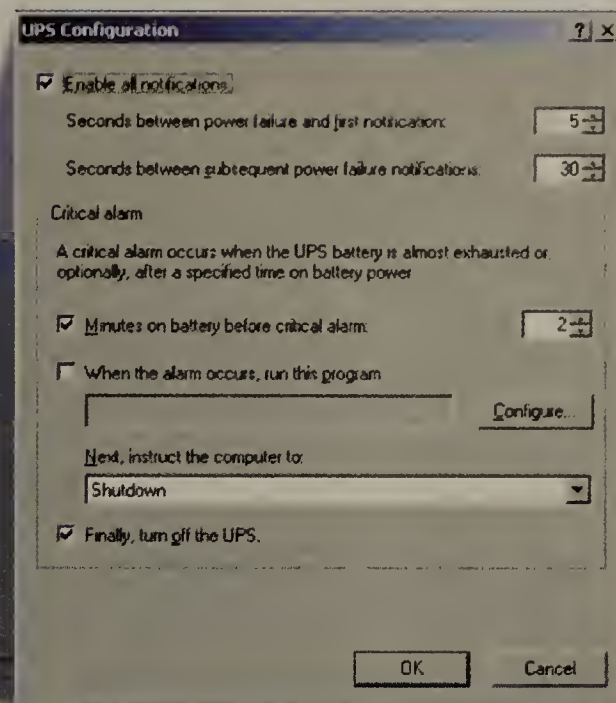
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Tolly on Technology . Kevin Tolly

## LUCENT SPINOFF HAS TOUGH ROAD AHEAD

**W**hile the recent announcement that Lucent would spin off its Enterprise Systems businesses made Wall Street smile on the parent company's

stock, the emancipated child faces formidable challenges. All talk about "focus" aside, the fact is that the new arrangement won't make selling Lucent campus

solutions any easier.

The new spinoff cannot simply continue on its way, relieved now of that nagging parent. The old story won't

work, and the old strategy, which apparently was not working too well to begin with, will need to be shed completely.

To make matters worse, the spinoff finds itself in an awkward category. While it is no longer a Nortel Networks-sized behemoth offering every product under the sun, neither is it a relatively small and nimble company such as Foundry Networks, able to keep a finger on the industry's pulse and turn on a dime.

This distinction is not just academic. The network industry has become increasingly polarized as Cisco, Nortel and Alcatel have scarfed up companies. More and more it seems that we find companies that do one thing — like Web switching, wireless LANs or caching — or virtually everything. The old Lucent was clearly in the latter category. The spinoff is somewhere in between.

While there was no "comfortable" place to tear the companies apart, the point Lucent chose is particularly painful. At a time when the lines between LAN and WAN are blurring, when campus networks will become more tightly linked to WAN services as the application service provider market surges, Lucent chose to split the companies at the LAN-WAN boundary. Ouch.

Soon, the spinoff will go on its way, carrying with it the Prominet and LAN-NET campus switching assets. No longer will it be able to fortify its story by tying in the substantial technology assets that Ascend, Xedia and others brought to the table. Those units are staying with the parent. For the new Lucent, it is the end of an era that never began.

One can only imagine the battering that the new Lucent is going to take from both its large and small competitors. Lucent's biggest challenge will be proving that interfacing LAN with WAN is not black magic — that buying "best-in-class" campus switching gear from Lucent is the way to go. Simply put, if the new company can't succeed in decoupling the LAN purchase from the WAN purchase, it's dead.

With no previous installed base to speak of, virtually every Lucent network would be a mixed, heterogeneous network. Incumbent Cisco has put the fear of God into customers when it comes to tainting their networks with non-Cisco gear. That fear, uncertainty and doubt may have been the most important contributor to Lucent's previous lack of success. Now, it is Lucent's greatest enemy. Unless attacked and overcome, the spinoff's prospects are gloomy.

The silver lining here for customers is that if the new Lucent succeeds, we may see the uncertainty about mixed networks finally put to rest. And that would be a major step forward.

*Tolly is president of The Tolly Group, a strategic consulting and independent testing firm in Manasquan, N.J. He can be reached at ktolly@tolly.com.*

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# The service-pack shuffle ruffles a lot of feathers

BY DENI CONNOR

Applying service packs regularly is a pain. And when they fail to fix the bugs they're supposed to fix — or worse, cause new problems — network managers begin to wonder if what they're really doing is substituting their hard work for vendor quality-assurance programs.

While by no means the only offenders, the network operating systems from Microsoft and Novell are good examples of the widespread phenomenon, according to users and industry analysts.

For example, Novell has released four support packs for NetWare 5 in the year and a half it has been on the market. Support Pack 3 fixed between 1,200 and 1,500 bugs, according to the company, although many were minor, such as screen misspellings or unnecessary error messages. Microsoft has issued six service packs for Windows NT 4 and is readying its first for Windows 2000.

The frequency of these releases raises questions in the minds of network managers: Should we apply the support pack now, or wait for other users to try it? And should we wait for the service pack to be rereleased before we install it on our network?

Take the case of Support Pack 3 for NetWare 5. It was meant to correct errors, but it also destroyed data on about 50 customers' networks, Novell acknowledges. The company is currently beta-testing another round of fixes and tells customers to expect a NetWare support pack next month.

Ian Bradley, assistant to the group IT manager at building products firm Cape plc in the U.K., lost data on a NetWare 5 network when he applied Support Pack 3 and had to rebuild the system from scratch. He's learned to wait for the rereleased "Version A" and to first try out the support pack on a test system before turning it loose on his 1,000-user production network.

"The rate that vendors are patching and repatching packs is ludicrous," says James Cimino, president of Bright Ideas, a consultancy in Edison, N.J. "It illustrates the pressure companies are under to release new products and shows that these companies aren't putting the money into quality control they should."

Users have also been vocal on Microsoft's and Novell's Internet forums.

"Ideally vendors should test [service packs] to ensure 100% reliability, but that's not realistic. Having said that, Novell should have done sufficient testing to identify the kinds of problems this service pack has caused. I am amazed this one passed any testing whatsoever," says Ed Partridge, IS

## OPERATING SYSTEM FIXES

*Fix after fix after fix seen by some as a substitute for vendor quality assurance.*

### Tips for applying service/support packs

1. Get a clean backup of your system.
2. Apply it to a test network before releasing it on your production network.
3. Watch Novell and Microsoft forums to see other network managers' experiences with service/support packs.
4. Apply one service/support pack successfully before applying another.
5. Follow the instructions for applying the service/support pack.
6. Do not apply a service/support pack unless it fixes something you need. In other words, if it isn't broken, don't fix it.

manager for Zevex International in Salt Lake City.

*Network World* talked to a number of users like Partridge about whether service/support packs should be used to introduce new features, whether vendors are treating users as "quality-assurance guinea pigs" and how users should handle service packs in the future. Users say something needs to be done to make sure the software is ready for market and relatively bug-free.

### Adding features with the fixes

Bug fixes aren't the only problem. Vendors will often hide software enhancements in their service packs. Service Pack 4 for Windows NT is among them. In addition to fixing bugs, the service pack added support for Web-based network management and utilities to increase the reliability of NT.

"Novell [and Microsoft] are not just fixing bugs in support packs, they are releasing features. That makes for very big and frequent support packs," says Chip DiComo, a network manager who supports about 4,000 users for global transportation company Hellmann Worldwide Logistics in Miami.

"Service packs should really be fixing issues, not adding feature enhancements," says Ward Cox, data processing programming lead at the University of Maryland College Park. "I'd like to see more point releases to do those feature adds." He manages 1,200 users on a heterogeneous NetWare 4.11/5.0 network.

Microsoft apparently agrees. Its last two service packs contained only bug fixes, according to Craig Veilinson, lead product manager for Windows 2000. "Until last May, Microsoft saw service packs as a way to add new features, and we weren't able to deliver service packs on as regular a basis as customers wanted them." Microsoft also changed its testing of service packs. Now after each bug is fixed, the software is run through the entire testing suite, eliminating complications and conflicts, the company claims.

Cox is among those who believe service-pack quality has slipped, and he blames the increasing complexity of networks.

"One person may have server brand XY with hardware configuration AB, and someone may have brand FG and configuration JK," he says. "You can't do a completely comprehensive testing of the software, be it a new revision of the operating system or a software patch."

"That's why there is an inherent distrust in service packs," he says. "Users may have experienced NT Service Pack 2. Or, they may remember the NetWare 4 support pack that clobbered Computer Associates' backup software."

Most users say that Novell and Microsoft are releasing service/support packs too early before they perform adequate quality-assurance testing.

"In an ideal world, there would be no need for service packs, as the product would work correctly when bought," says Grant Cobley, IT manager for IRPC Group Limited, a business services company in Hinkley, U.K.

Opinions regarding the relative merits of service packs from the different vendors are predictably mixed.

"Novell is a more stable environment than NT, even if it does come out with support packs," says DiComo. "I had an NT server blow up this afternoon after applying a service pack. I can install products on a NetWare server all day long and apply support packs, and I don't lose all my services like I do with NT."

Both DiComo and Cox adopt the vendors' advice to back up the network completely before applying a service/support pack. In NetWare, they also enable an option that lets them revert to previous conditions if problems occur.

Cobley doubles up his approach to service packs. He uses four measures to protect his network against harm from service/support packs. He tries the pack on a test network, he backs up his production network and if problems occur, he rolls back the support pack step by step.

And, his biggest insurance against failure is "waiting a few weeks after it's been released to make sure there are no issues before I apply it." ▀



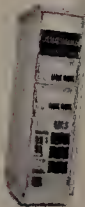


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# Carriers & ISPs

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## Briefs

State telecom regulators have decided they don't like a lobbying effort under way to allow Bell companies to carry data and Internet traffic across local boundaries before they get general long-distance approval. The National Association of Regulatory Utility Commissioners, which represents telecom and energy regulators in the 50 states, passed a resolution opposing congressional bills to free up Bells to create long-haul data backbones even before they submit state-by-state, long-distance applications to the government. Some of the Bells have funded a lobbying group headed by former White House Press Secretary Mike McCurry to push for the idea, arguing they could provide a needed boost in Internet backbone capacity. Critics say the Bells could do a lot more for the Internet by concentrating on speeding up the local loop.

Broadband carrier Level 3 Communications is spreading its wings overseas, announcing last week it has completed metropolitan fiber networks in Amsterdam and Frankfurt and opened a switching gateway with collocation space for other carriers in Brussels. It now has facilities in 27 U.S. and five foreign markets, on its way to a goal of 56 U.S. and 21 international markets.

Big names in carrier networking are teaming with smaller digital subscriber line companies to offer voice-over-DSL platforms to carriers. Alcatel and CopperCom are teaming to sell their equipment, as are Lucent and Jetstream. Alcatel and Lucent sell DSL multiplexers but lack their own voice-over-DSL gear. Carriers would use the equipment packages to offer multiple voice channels plus data all over a single DSL link.

## Japan's NTT to be first ISP to offer IPv6

BY CAROLYN DUFFY  
MARSAN

Japanese telecommunications giant NTT last week announced the first commercial Internet service supporting IPv6, a comprehensive and controversial upgrade to the 30-year-old communications protocol that underpins the Internet.

NTT's announcement was made at the IPv6 Global Summit, a gathering of 150 Internet engineers and product designers, held in Telluride, Colo. The summit was sponsored by the IPv6 Forum, a group of 80 companies and research institutions promoting the IPv6 standard.

Developed by the Internet Engineering Task Force, IPv6 offers corporate network managers several benefits over the current IPv4 protocol. IPv6, which uses a 128-bit addressing scheme, supports a virtually limitless number of uniquely identified systems on the 'Net, while IPv4 supports only a few billion because

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### PLOTTING IPv6's FUTURE

Cisco Chief Technology Officer Judy Estrin says there are catalysts coming to the fore that will spark a need for IPv6. Listen to a rebroadcast of her presentation.

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it uses a 32-bit addressing scheme. IPv6 also offers easier administration and tighter security.

However, migrating to IPv6 is an expensive and time-consuming proposition. Few IPv6-compliant products are shipping, and ISPs have been slow to support the standard. That's why NTT's announcement is so significant, accord-

ing to IPv6 proponents.

"[NTT] would be the first official ISP to offer real IPv6 services," says Jim Bound, co-chairman of the IPv6 Forum's Technical Directorate and a principal member of the technical staff at Compaq. "[This announcement] is a major critical milestone for the deployment of IPv6."

"I think this clearly represents the importance of IPv6 to Japan . . . and to the rest of the world," says Bob Fink, director of the Energy Sciences Network (ESnet), which provides IPv6 service to U.S. government agencies for research purposes. "[This announcement] represents an aggressive step by NTT to take their place as the worldwide ISP by being aggressive with new technology beyond their borders."

Until now, IPv6 service was available only through research networks such as ESnet, the IETF's 6bone and the academic community's 6ren. What NTT will offer starting in April is a true commercial See **IPv6**, page 44

## GTE Internetworking may soon be flying solo



While GTE Internetworking's parent company GTE Corp. works out the details of its

planned merger with Bell Atlantic, the ISP is considering the advantages of going it alone. GTE Internetworking President Paul Gudonis recently spoke with Senior Editor Denise Pappalardo and Editor in Chief John Dix about the chances of getting spun off and the ISP's role going forward.

**Bell Atlantic recently told regulators it would be willing to spin off or sell GTE Internetworking in order to see its planned acquisition of GTE Corp. through. How will that affect GTE Internetworking?**

That's the proposal in front of [the Federal Communications Commission] right now. I happen to think it's a very good idea because it will not only enable the GTE and Bell Atlantic merger, but it will also enable us to expand even faster

than we have been. We will bring additional capital into the business and be in a position to step up our investments in infrastructure and global expansion.

**How will you bring in additional capital?**

By issuing a separate stock to be sold to the public.

**Will GTE Internetworking be a separate subsidiary of the joint company?**

We'll be an independently traded company. Bell Atlantic and GTE Corp. would own 10% of GTE Internetworking, which will be getting a new name, and 90% of the company will be publicly traded. The joint company will be permitted to further buy into GTE Internetworking as it gets long-distance service approvals in additional states.

**Isn't GTE Internetworking's Internet business one of the crown jewels of the deal between Bell Atlantic and GTE? Or is it that Bell Atlantic is more focused on**

**increasing its consumer footprint?**

No. I believe that the Internet is a key part of the future of the telecommunications industry, and the joint company will continue to own an equity interest in GTE Internetworking going forward.



**GTE Internetworking offers services to business users and other carriers. How does your customer base break down?**

Our customers are about 60% service providers and 40% enterprise business users.

**In October, GTE Internetworking made some voice-over-IP wholesale service announcements. Are you planning a business voice-over-IP service, and if so, what would it look like?**

We're evaluating technologies and trying to understand what the market opportunity is. And we're learning from our experience in operating our current voice-over-IP network that's supporting millions of minutes per day now. No See **GTE Internetworking**, page 45



# Gabriel network promises lower costs

BY TIM GREENE

ST. LOUIS — Gabriel Communications started offering voice, Internet access

and virtual private network services in 1998 so its customers could get one bill from one provider.

The idea was a lot simpler than set-

ting up the network.

But now the company has settled on a network design that handles voice and data on a single platform, resulting

in lower network costs for Gabriel. Those savings can be passed on to customers, the company says.

Initially the company deployed a Nortel DMS class 5 local voice switch to handle voice traffic, and a Lucent PSAX ATM switch to handle data. "We took a traditional approach," says Jerry Howe, Gabriel's president.

Gabriel had no choice. The multiservice switches it wanted to use were not available. Vendors were making plans but had nothing Gabriel could install.

The traditional combination of switches was expensive, occupied a big footprint in expensive collocation space in local carrier switching offices, and required diverse expertise from Gabriel.

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As a result, both switches will be replaced in future rollouts by a multiservice switch — the Tachion Fusion 5000, which can handle traffic bound for voice phone networks, data networks or the Internet. "We're looking at the Tachion switch as a way to cap our investment in DMS switches and we are working on a migration strategy to move all services to the [Fusion 5000]," Howe says.

The Tachion switch saves up to 50% off the costs associated with buying separate voice and data switches, Gabriel says.

All Gabriel customers get T-1 access. Gabriel installs a Vina Technologies integrated access device (IAD) at customer sites to aggregate voice and data traffic onto the T-1 link.

The company is also considering use of digital subscriber line (DSL) and IADs made by other vendors as access technology. DSL requires the company leasing space in local carrier switching offices to take in DSL traffic and back-haul it to Gabriel's network. The first DSL offerings will roll out this summer, with 175 collocations set up by year-end.

Howe says Gabriel was drawn to Tachion because it supports voice-call features over a data network better than traditional data-switch vendors that were trying to add voice.

The firm is up and running in St. Louis; Kansas City, Mo.; Springfield, Mo.; Wichita, Kans.; Little Rock, Ark.; Tulsa, Okla.; and Oklahoma City.

Gabriel: [www.gabrielcom.net](http://www.gabrielcom.net)





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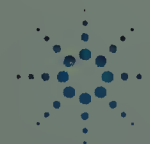
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# Intermedia offers bandwidth options

*Carrier will install ASC access concentrators to provide frame relay from 64K to 12M bit/sec.*

BY DAVID ROHDE

VIENNA, VA. — Popular frame relay carrier Intermedia is tapping a maker of high-end integrated access devices in preparation for the launch of a new type of high-speed frame service.

Intermedia will install access concentrators from Advanced Switching Communications (ASC) that create frame relay links at intermediate speeds between T-1 and T-3, the two companies announced last week.

As a result, Intermedia will be able to offer enterprise users a range of frame relay options from 64K bit/sec to 12M bit/sec.

ASC's MultiStream switches for the carrier point of presence are among the first to implement the Frame Relay Forum's Multilink Frame Relay (MFR) specification, ratified last September.

MFR defines a way to combine multiple T-1 frame relay interfaces so they appear as a single traffic stream to the network.

As a result, network managers can choose intermediate speeds — known alternatively as NxT-1 or fractional T-3 — for high-traffic sites without having to divide their branch-to-host traffic into separate T-1 clusters or choose a more expensive T-3.

## Specification support

Some switch vendors have previously implemented their own version of multilink frame relay. But the MultiStream gear from Vienna, Va.-based ASC is designed to provide interoperability via support of the MFR specification, also known as FRF.16. Intermedia has gained much

of its data business through network-to-network interfaces with other frame relay carriers, particularly regional Bell operating companies that are barred from carrying traffic beyond local boundaries.

MFR is frame relay's analogue to the older inverse-multiplexing-over-ATM standard, which likewise provides a choice of NxT-1 options. In fact, ASC's MultiStream gear supports ATM, including standards-based inverse multiplexing, as well as frame relay.

But by incorporating the parallel frame relay option, analysts say, carriers such as Intermedia that employ the ASC boxes can get a bigger punch in the marketplace for users who'd rather stick with frame relay as they move up the bandwidth chain.

Intermedia: [www.intermedia.com](http://www.intermedia.com);  
ASC: [www.asc.com](http://www.asc.com)

IPv6,  
Continued from page 41

service — complete with monthly flat-rate pricing and service-level agreements. It will run out of a data center in San Jose and targets network product vendors, ISPs and corporate users that want to test IPv6 products and applications.

"We will run this facility as part of our business, so we will be responsible for it," says Shin Miyakawa, who leads the IPv6 research effort at NTT Multimedia Communications Laboratories in Palo Alto. "The most significant difference from the other [IPv6 networks] is that we will guarantee a level of service."

Miyakawa says NTT has been offering experimental IPv6 service to some of its customers at no cost. He says the company is also reaching out to other ISPs to try to build broader IPv6 services.

Although NTT's service is initially available to companies in the San Francisco Bay area only, NTT plans to extend the service to the New York area later this year. ■

VOICE

DATA

VIDEO

Information is



**GTE Internetworking,**  
continued from page 41

product announcements, but we're continuing to work on the technology.

**How do you see voice-over-IP services unfolding for business users? Do you think they would be combined with your virtual private network [VPN] offering?**

I think it has the most compelling value proposition when it's part of a VPN that companies implement.

We see companies replacing some of their private lines with Internet VPNs or extending their frame relay networks to smaller branch offices or overseas offices by using VPN services on the Internet.

Voice would seem to be a logical extension. That's probably the place you'll see it happen first in the business environment.

**What are some of the reasons voice over IP hasn't penetrated the business market yet?**

If you look at the chief information

officer's Top 10 list, at least in 1999, changing to a new long-distance voice service didn't make the Top 10 list. Other issues such as Year 2000, [enterprise resource planning] applications, e-commerce, the whole Internet, intranet, extranet challenge and keeping those networks secure have been higher priorities.

And you've got continued reduction in business long-distance voice services rates from the big [interexchange carriers], so there really hasn't been this compelling drive by CIOs to get a new solution.

**Is GTE Internetworking offering wireless Internet access service now?**

No. GTE Internetworking is working with the other parts of Bell Atlantic and GTE to be the country's largest wireless phone company, especially when the merger with Airtouch Vodafone comes together.

So that puts us in an excellent position to work with that part of GTE/Bell Atlantic to enable the next big thing, which will be wireless Internet access.

**Application service provider offerings are another big area of interest. Where does GTE Internetworking play in the ASP game?**

GTE Internetworking has a high-speed, reliable backbone that supports OC-192. We have 10 data centers and undersea cable connections for additional international connectivity. We have secure VPN services that can be wrapped around an ASP's rental application offering.

**So you're not going to be an ASP. You'll provide network and hosting services to other ASPs?**

We're actually an ASPI. It's a term I coined meaning we're the ASP infrastructure.

**So how is this different from, say, a UUNET or other competitors?**

One difference is if you go to some of our competitors, they will sell you pipes or dial-up service or some basic Web site hosting service. We have a much more tightly integrated offer.

So our competitors will basically fax

you a one-page proposal, and we will work with a firm like Bank One by asking them how they plan to grow their business.

Are they going to offer financial products online? Are they going to offer mortgages online?

We'll work with them in terms of the architecture, meaning how do you set up back-end systems for the Web site, how much capacity is needed, how do you distribute the traffic load over multiple data centers.

That's a much more complex business solution, rather than just saying, here's the price for a T-1, here's the price for a Unix Web site.■

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Eye on the carriers . David Rohde

## LUCENT STILL HUNTING FOR KEY TO ENTERPRISE

**C**arriers can choose from two paths. Many provide retail voice and data services, with all the associated customer service headaches. But some,

such as Williams and Level 3 Communications, stick to providing big pipes for other carriers that actually do the dirty work of serving end users.

The same kind of decision faces box vendors that serve carriers and enterprises. Consider Lucent. Last November, responding to concerns that its enter-

prise data strategy was buried under its carrier push, Lucent announced it was creating a consolidated enterprise networks unit. So when it recently unveiled what looked like a spinoff of its enterprise business, it seemed Lucent was just carrying that strategy a step further.

Except that isn't what's happening, because the November reorganization never really took. Instead, Lucent is simply taking three old divisions and hurling them out of the company. The big one is its voice products group, which remains little changed organizationally from before 1996, when it was AT&T Global Business Communications Systems. The other two are its Systimax cabling unit and its LAN switching business. What's missing from the spinoff are all the products at the WAN edge, such as virtual private network routers, remote access concentrators and firewall products.

The official explanation is that the WAN edge, even on the customer premise, straddles the boundary between enterprise and service provider nets. The real story, barely concealed by Lucent officials, is that CEO Rich McGinn is juiced up about the acquisitions of Ascend and Xedia, where most of these products come from, and much less engaged in old 10/100 Ethernet switch ports and structured wiring.

Lucent may present the spinoff as an enterprise play, but of its \$8 billion in revenue, IDC estimates that only \$270 million come from data switches. The spinoff is basically a big PBX company.

Maybe that's not so bad. There's never been a large, U.S.-based dedicated PBX vendor. Most other PBX players are units of foreign conglomerates. Nortel Networks' PBX base never contributed as much revenue as its carrier voice products, and back in the AT&T days, what's now Lucent was overshadowed by AT&T's long-distance revenue.

But on the data side, it begins in a sorry No. 10 position in switch ports shipped. And it'll have to start from scratch to develop an integrated LAN/WAN strategy. All this at a time when Cisco — with 30 times Lucent's share in LAN switch ports — has also shipped a half million voice-enabled, modular 2600 and 3600 multiservice access routers.

Users could buy WAN gear from the non-spun-off Lucent, but McGinn has bought so heavily into the carrier-managed network concept that he's never fully developed an enterprise data channel. Without feet on the street and value-added resellers in the door, it's difficult to see how Lucent can make much more of a mark. After 20 years of largely squandered Bell Labs data patents and four years of expensive acquisitions, it seems Lucent is still seeking the key to the enterprise network.

*Rohde is a senior editor with Network World. He can be reached at [drobde@nww.com](mailto:drobde@nww.com).*



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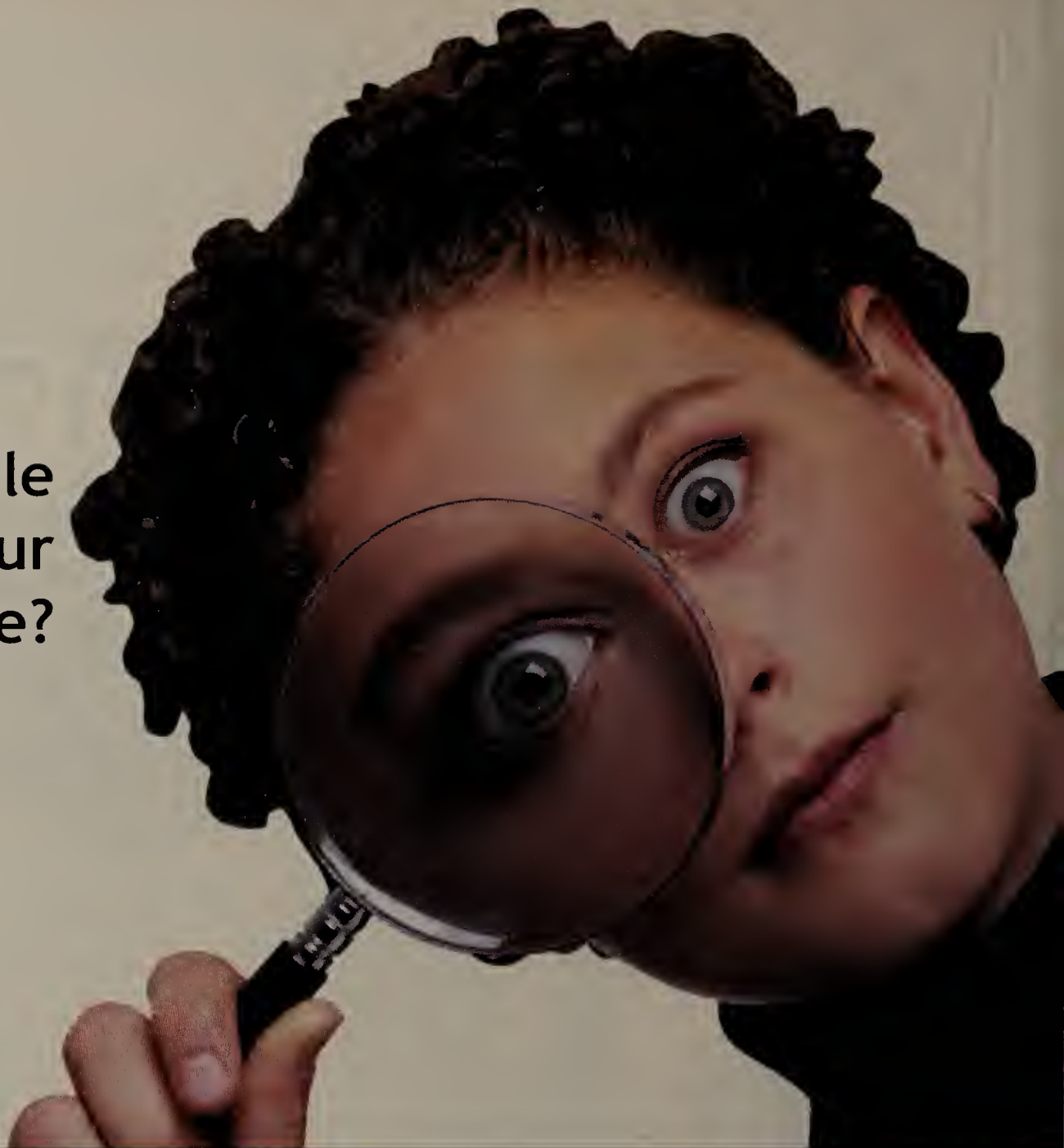
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## Briefs

Microsoft is taking an equity stake of about 20% in **RealNames**, whose software lets Internet users access sites by typing in only the name of a company or brand at the address line on their browsers rather than the full URL. Microsoft also has agreed to bolster its support for the RealNames keyword approach to Internet searching in its Microsoft Network Search and Internet Explorer Web browser offerings. The companies declined to reveal the dollar value of Microsoft's investment in RealNames.

**Ariba and American Express** will jointly develop and market electronic payment services in a global alliance, while Ariba has entered into a broad business-to-business e-commerce alliance with Dell. Ariba and Amex aim to jointly deliver Internet-based commerce services designed to help buyers, suppliers and market makers automate their processes. The companies' first joint offering will include a new "pay-on-ship" service, which will eliminate the need for manually created invoices and payment requests by triggering automatic electronic payments at shipment time, the companies say.

Over the next few months, Dell plans to build an electronic marketplace based on Ariba offerings that will be aimed at serving the PC vendor's small and mid-size business customers.

**E.piphany** last week announced plans to buy **Octane Software** in a deal valued at about \$3 billion between the two e-commerce software vendors. E.piphany's software enables companies to sort through customer data and base marketing campaigns on that information. Octane's software helps to handle online purchases.

## Never-say-die database targets Web sites

*Clustra database originally built for telcos, but now geared toward high-volume Web sites.*

BY JOHN COX

**BURLINGTON, MASS.** — Clustra Systems, a spinoff of Norwegian telco Telenor, initially built its high-performance database for the telecommunications industry. But the company is aiming its latest version at high-volume Web sites.

The Clustra Parallel Data Server 3.0 is designed to stay up and running even in the event of computer or network outages. In effect, the software makes a copy of the data, fragments the original and the copy, and then spreads them across scores of processors, each with its own memory and disk storage. If any processor fails, the server can rebuild the data on a spare one.

This "shared nothing" architecture means that the failure of any one processor only affects a small portion of the data in the database, which continues to run as it rebuilds the affected data on a different processor.

Clustra's software originally was used by telecom providers for such tasks as

high-speed, high-volume directory lookups. But

Clustra figures the software is also a good fit for Web sites, where systems failures can lead to big losses in revenue and customer satisfaction. Today, the job of building a fault-tolerant Web site is laborious, says Gary Ebersole, a senior vice president at Clustra. Companies typically need to piece together special computers and database versions as well as third-party clustering and cluster management software, he says.

"Our server was designed from the outset for less than 2 minutes of downtime per year, whether planned or unplanned," Ebersole says.

Clustra guarantees that if the server

goes down in a given month, the customer doesn't have to pay that month's licensing fee.

Other database vendors have taken a different approach. Informix, for example, offers an entirely separate database product for high-availability applications, Ebersole says. In any case, none of Clustra's competitors will claim 99.999%

See **Clustra**, page 52

### PROFILE: CLUSTRA SYSTEMS

**Headquarters:** Burlington, Mass.

**Founded:** November 1997, as a spinoff from Telenor, the privatized Norwegian telco.

**Product:** Clustra Parallel Data Server 3.0, a high-performance, fault-tolerant database management system targeted at round-the-clock e-commerce sites.

**Key employees:** Karl Klingsheim, founder, president and CEO, former head of Telenor's R&D group; Svein-Olaf Hvasshovd, founder, chief technology officer and vice president of product development.

**Employees:** 65

**Funding:** Privately funded by Telenor Ventures, VantagePoint Venture Partners and Argo Capital Group.

## Teens put off college, rev up new search engines

*Topic-specific search engine technology could help firms use the Web more efficiently.*

BY JASON MESERVE

**DURHAM, N.C.** — While most high school kids are trying to scrape money together for college, two North Carolina teens are looking to pull in a round of venture funding for their new start-up, Pinpoint.com, which makes topic-specific search engines.

With the number of pages on the Web surpassing one billion, the need for more accurate search results continues to grow. During their senior year of high school, Jud Bowman and Taylor Brockman developed an engine and algorithm that allows companies to index only segments of the Web that are relevant to their business needs. Pinpoint's customers supply a lexicon of words related to their businesses as well as examples of Web sites that should and should not be included in the index. Using this profile, Pinpoint's

Web crawlers and algorithm scour and analyze the Web for relevant sites.

One of Pinpoint's early customers is StartUpStreet.com, another Durham firm dedicated to helping an entrepreneur go from concept to launch — that is, using Pinpoint as a value-added ser-

vice for its customers. "For entrepreneurs just starting out, time and money are everything," says Sarah Jones, StartUpStreet's director of operations. "We want to help them search faster and get to relevant topics more quickly."

For StartUpStreet's customers, this means that when they enter a search for "sweat equity" they only get results pertaining to service providers that waive fees in exchange for equity, rather than what work to do on a house to add value, Jones says.

Bowman came up with the idea during a summer camp at the Massachusetts Institute of Technology and enlisted Brockman, a fellow student at the North Carolina School of Science and Mathematics, to help. The two lived in the same dorm and spent many free nights working on the self-driven project. "The kids at the school do neat

See **Search**, page 52

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# Tally Systems, NTP bolster management wares

*Tally upgrades asset management line, adds remote capabilities; NTP revamps server control software.*

BY JOHN FONTANA

Two management software vendors are expanding their tool sets to give IT executives more options for managing their applications and network systems.

Tally Systems is overhauling its line of asset management software and adding features that will allow companies to track and analyze their hardware and software inventories, as well as remotely deploy and monitor software.

Separately, NTP Software is revamping its server management software, which monitors adherence to policies such as disk quotas, to ease installation and administration. NTP is also adding a software developers kit that can be used to plug NTP management capabilities into applications.

Tally last Monday introduced TS.Asset for the in-depth analysis of corporate servers, PCs and software assets, and TS.Ready, which allows the electronic distribution and remote management of software. Tally also renamed all its products to reflect the "TS" name.

TS.Asset will allow IT executives

to track cost, procurement, leasing, and license compliance on hardware and software, and analyze that data from a central repository. The software complements Tally's NetCensus,

ment and returning it on time. We're able to identify where equipment is and where to find it when it needs to be returned."

Dominion Resources' Total Assessment Management System begins tracking equipment the minute it is shipped by the supplier and follows the gear from the warehouse to IT to the desktop and back again.

Tally plans to release a number of modules for TS.Asset to track such things as software license compliance.

"We now can examine the financial and legal data, not just the physical data," says Michael Gray, director of asset management products, Tally Systems

**"We now can examine the financial and legal data, not just the physical data. . . . It's a more comprehensive view of assets that helps support business decisions."**

Michael Gray, director of asset management products, Tally Systems

which tracks information such as what applications are running on what desktops. NetCensus has been renamed TS.Census.

Tally acquired the TS.Asset technology earlier this month when it purchased NetBalance and its IT Ledger software.

"What we're really doing with IT Ledger is managing total cost of ownership of our equipment," says Wyman Smith, a project manager at power company Dominion Resources in Richmond, Va. "The biggest bang for our buck is tracking leased equip-

ments for Tally. "It's a more comprehensive view of assets that helps support business decisions."

Tally's TS.Ready is an OEM version of Swan International's Vision64, which supports the electronic distribution of software, remote control and application self-healing.

## NTP revamps

NTP is also revamping its line of software by adding features that will help users support rollouts of Windows 2000 and Active Directory,

port with Release 4.0 in September.

Near year-end, Clustra will add the ability to replicate data among Clustra servers at different sites. By June, programmers will be able to use Java to write database-stored procedures, which are like small applications stored in the database.

Clustra's software is available now. Pricing starts at \$75,000 for a four-node license on Intel processors. Eventually, the software will be ported to RISC computers running Solaris and HP-UX.

Clustra: [www.clustra.com](http://www.clustra.com)

## Management tools

**Tally Systems last week unveiled its TS.Asset product for the planning and analysis of financial, legal and physical asset information within any enterprise.**

TS.Asset allows users to track enterprise equipment leases, among other things.

Type	Product	Purchase Price	Current Rate	Quantity	Rent Amount	Act. Quantity	Act. Rent Am.
Main	ThinkPad 755CX	\$1,570.00	\$65.00	3	\$195.00	3	\$195.00
Main	T1200XE	\$1,870.00	\$71.00	3	\$213.00	4	\$284.00
Main	T5200	\$2,700.00	\$108.00	3	\$324.00	1	\$108.00
Main	4202-001 Proprinter XL	\$580.00	\$34.00	1	\$34.00	1	\$34.00

and create a uniform application and messaging management infrastructure.

NTP later this month will ship the first product that includes its new Enterprise Application Services Extension (EASE), which supports centralized administration for all NTP management applications. NTP System Sentinel, which monitors server and application health on Windows NT 4.0 networks, will be the first product to include EASE.

NTP plans to add EASE to its other applications, including Quota Manager, RAS Manager and List Manager.

NTP is using EASE as a migration bridge to Win 2000. EASE is a Win 2000-like environment, so application management can be migrated to Active Directory if users

upgrade their NT 4.0 servers.

"Some components, like user security and storage of application configurations, can be moved to Active Directory, while EASE will be used to collect management statistics," says Bruce Backa, president of NTP.

NTP also plans to make EASE available as a tool kit so developers can add features such as SNMP reporting, event management and e-mail integration to their applications. EASE is expected to ship in the second quarter, and the development kit will be available in the second half of the year.

Pricing on the Tally and NTP software has not been set.

Tally: [www.tallysystems.com](http://www.tallysystems.com); NTP: [www.ntpsoftware.com](http://www.ntpsoftware.com)

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**Clustra,**  
continued from page 49

uptime and guarantee it, he says.

Clustra runs on low-cost Intel-based computers, which can be rack-mounted. Currently, the software runs on Linux, Windows NT 4.0 or FreeBSD, a Unix variant. With this approach, "the operating system itself doesn't have to scale, we do that," Ebersole says.

With most Web sites, companies add more Web or application servers to handle larger loads. But the traditional data-

bases behind the Web site can't scale so easily, and adding more disks or processors often means taking the entire database offline.

By contrast, Clustra administrators simply plug in new rack-mounted computers and additional disk arrays, and load a new instance of the database. One drawback is that application developers must use Clustra's native API instead of the standard SQL '92 interface. Ebersole insists the programming is "completely transparent" to the developers, but Clustra will add SQL '92 sup-

college for the time being in order to focus on their start-up.

Pinpoint will sell its engine under an application service provider model. The company will host the database and customize the engine, but all front-end interfaces will stay on a customer's Web site. The engine is written in C and runs on customized Red Hat Linux machines. The service is hosted at Exodus' Sterling, Va., facility. Pricing has yet to be determined. ■

**Search,**  
continued from page 49

projects on their own time," Bowman says. "This is the project we worked on instead of sleep."

The project has turned into an 18-person company in just over a year and generated \$800,000 in funding to date. A second round of funding is scheduled to close later this month. Bowman and Brockman have put off plans to go to



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\*Hurry, this offer is only available until April 30, 2000.



Network Inspector now works with Visio.



# Collaboration service tuned for Web browsers

BY JOHN COX

BOSTON — Companies looking to do projects online have an improved option from X-Collaboration Software, which has upgraded its collaboration service with a new browser interface and better support for third-party applications.

The changes to the hosted service, dubbed X-Community, mean that subscribers need only a Web browser to participate in and run document-oriented projects online. The original version of the service was launched last summer.

"It's one of the most underestimated technologies I've seen recently," says Nathaniel Palmer, an analyst with The Delphi Group, a research company in Boston. He says X-Community is a place where members of different audiences in different locations can share in a set of free-form and interrelated activities.

Traditional client/server applications, and even groupware such as Lotus Notes, are not well-suited to this kind of shared work, Palmer says. That's because

Notes, for example, requires client software to be distributed, users to be trained and predefined databases to be set up.

X-Community 3.0 is the result of on-site surveys and observation at hundreds of company sites. X-Collaboration's engineers eliminated the Windows client that was part of the original service and rebuilt a simpler user interface to match the Web browser. Still, the client interface works with whatever Windows applications subscribers

run on their desktops.

An important upgrade to Version 3.0 is better hooks for third-party services and applications, says Kevin Lo, the company's founder and chairman. X-

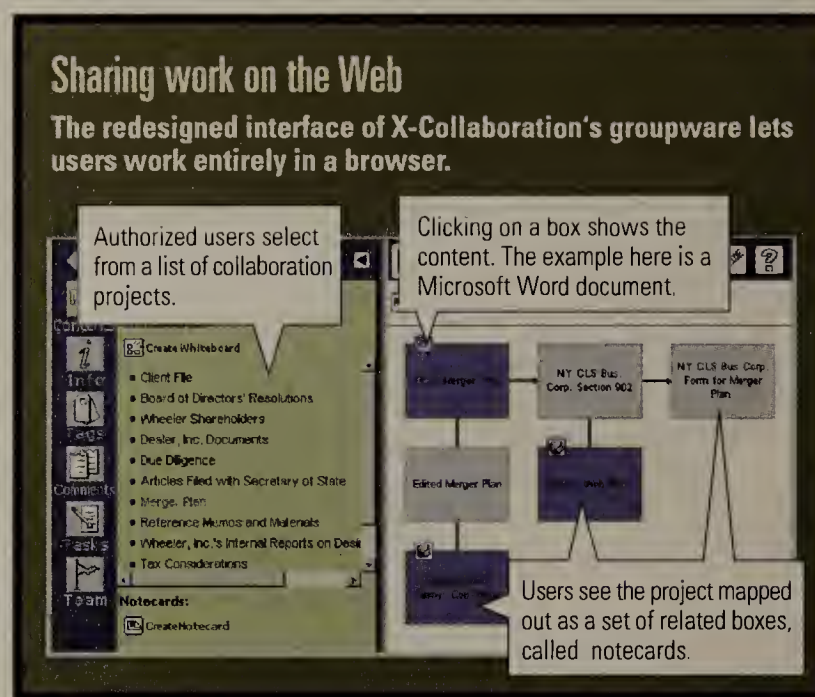
Collaboration has partnered with the Lexus-Nexus text search service, so an X-Community member who pays for the text service can find a document and pull it into the X-Community tool set, where it can be managed.

Another new X-Collaboration partner is VPNX.com, which will give X-Community members a secure virtual private network that lets them tunnel through the Internet.

Single memberships in X-Community are free. Each user gets a personal Web page, a shareable Web drive with 25M bytes of disk space and access to a free Business Center for a 30-day free trial.

The Business Centers are the nub of the X-Community: virtual spaces with an array of tools and services for creating and organizing projects. Corporate clients pay for them according to usage, based on the number of users who can access the center and the related storage space. For up to 10 users, the charge is \$100 per month, including 100M bytes of storage. An additional 100M bytes of storage is another \$50 per month.

X-Collaboration: [www.x-collaboration.com](http://www.x-collaboration.com)



888-882-4447

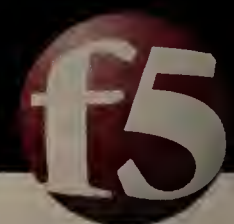
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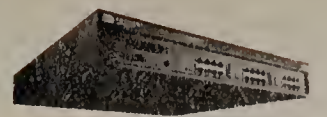


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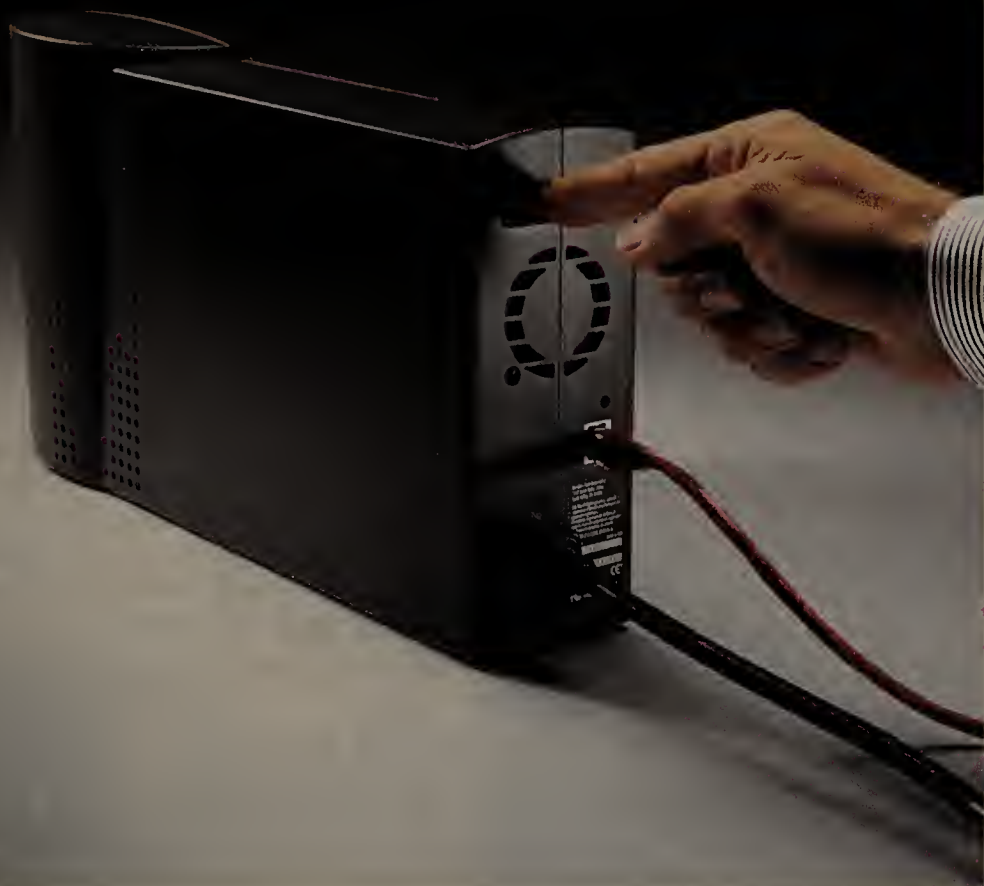
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# Keylime goes for big piece of Web site management pie

BY BOB BROWN

SAN DIEGO — Keylime Software this week will launch a service de-

signed to help companies take the mystery out of how their Web sites are being used.

The vendor's I-Echoes service deliv-

ers a standard set of reports that provide information on where Web site visitors are coming from, what they do when they visit the site and whether

they are regular or new visitors. The service can also be customized to report on, for example, how a company's particular Web-based marketing campaign is working.

Keylime, a 25-person shop with more than \$4 million in venture and other financing, has reinvented itself as an application service provider since starting up in 1997 as a software vendor. CEO Oran Thomas says the company tabled its original software for tracking enterprise applications when it became apparent that the company's core technology would be more attractive to customers as part of a service.

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The company hopes to set itself apart from existing Web site analysis offerings by delivering information faster than others and customizing it. The company claims it can capture and analyze information faster than others by grabbing data while the end user's session with the Web site is taking place. Keylime executives say other products collect data from a series of servers — Web, transaction and application servers — then need to consolidate that data before analyzing it and presenting it to the customer. Other companies in the Web site analysis market include Accrue, Net.Genesis and WebTrends.

Keylime's service works by including a tag on a customer's Web site that loads a JavaScript on the end user's browser. The tag then feeds information to Keylime's data center in San Diego. The end user's Web site activity data is collected by Web servers at the data center, then analyzed and compiled in reports by a host of Intel-based servers running database and other Microsoft software. Keylime is looking to build another data center to provide more redundancy.

Customers access the reports via secure Web servers at the data center. Reports can be updated as frequently as every five minutes, though most customers choose to be updated less often, Thomas says.

Beta customers include RealAge.com, *The Miami Herald* and TheGolfer.com, according to Keylime.

Pricing for the I-Echoes service starts at \$5,000 per month and increases based on the number of page views. The company claims it can get the service up and running at a customer site in 48 hours.

Keylime: [www.keylimesoftware.com](http://www.keylimesoftware.com)





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# Sterling mixes EDI, Web documents

BY ELIEN MESSMER

DUBLIN, OHIO — Although its roots are in the electronic data inter-

change realm, Sterling Commerce next month will ship Web-based purchase orders, invoices and other business documents that can be

swapped between suppliers and buyers online.

Called the Gentran Web Suite, the product line includes business forms

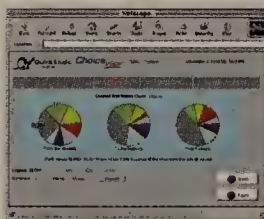
residing on one trading partner's Web server for download to the desktop of another trading partner via a Web browser's ActiveX controls. Once the business forms are completed, the Gentran software on the Web server can convert the HTML data into an EDI format or simply leave it as HTML.

Larger companies still rely on EDI as the preferred means for exchanging a wide range of business documents, says Kevin Byrd, marketing director at Sterling. He says smaller companies have often balked at using EDI due to technical challenges or cost issues.

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## Joining the Bell family

**Sterling Commerce, which posted \$561 million in revenue last year, is in the midst of being acquired by SBC Communications for \$3.9 billion. The companies expect to close the deal this month.**

Gentran Web Suite, expected to start at about \$90,000 per server, is for use by larger EDI-capable corporations so they can do business electronically with smaller companies where desktop browsers are the norm.

"The Internet has opened up other ways of doing business, but EDI still has a role," Byrd says. The Gentran Web Suite, which requires Microsoft's Internet Explorer browser or an ActiveX plug-in for the Netscape browser, lets the larger corporation define the business forms and determine whether the data is converted into EDI after it's collected at the Gentran Web server.

Sterling sees demand for EDI software and services still growing at almost 10% per year, though this is far less than the 30% growth experienced in earlier years.

Sterling is also starting up an IP-based, business-document processing service so companies can have many kinds of documents — not just EDI — stored and forwarded to intended recipients around the world. The service, called Commerce:Centre, will provide auditing of transmissions and a mailbox service in the U.S., India, Brazil, Europe and much of the Asia-Pacific region, Byrd says.

"This hosted service will operate like a secure extranet for our customers," Byrd says. Pricing for the services has not been released.

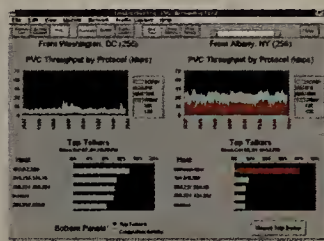
Sterling, which is in the midst of being acquired by SBC Communications, will become the carrier's e-commerce arm.

Sterling: [www.sterlingcommerce.com](http://www.sterlingcommerce.com)



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'Net Insider . Scott Bradner

## PLAYING GAMES WITH THE FUTURE OF THE 'NET

**M**ore than a few people made a pilgrimage to Tokyo on the first weekend in March. Most of them were only after the most realistic way

to cut up a monster and see blood splatter. But at the same time, they may have seen a big part of the Internet's future.

Sony introduced its newest PlayStation2 game machine March 4, and by the end of the weekend had sold about 980,000 units for the equiva-

lent of \$370 each. CNN and other news organizations interviewed people who had flown in from the U.S. just to get a copy. In response, Microsoft pre-announced by 18 months or more its own entry into the fray — the prosaically-named X-Box, which will be Microsoft's first computer.

By next year, Sony will have a broadband Internet adapter available for the PlayStation2 that could quickly make the game machine the most prevalent Internet device around. Sony expects to sell some eight million game machines in Japan by year-end. The PlayStation2 is expected to go on sale this autumn in the U.S. and Europe, where many millions more will be sold by the end of the Christmas buying season.

The PlayStation2 is an example of a new generation of game machines that are much more than just game machines. It can play CDs and DVDs, and will include a browser that can support basic Web access. It will also support Internet-based multiplayer games.

Microsoft had to react. If Web browsing becomes just another game on a less than-\$400 device plugged in to a TV, then Microsoft's WebTV and software for home computers are threatened.

As described, the X-Box is an impressive device with a 600-MHz CPU, a 300-MHz graphics processor, 64M bytes of memory, DVD support and an 8G byte disk drive. It puts the PlayStation2 to shame, but it is not due to go on the market until late 2001 (assuming it ships on time, a semiwarranted assumption at best with Microsoft products). That should give Sony a chance to develop a PlayStation3.

But as described, the Internet of the PlayStation2 is not the Internet of its fathers. It is an Internet that has far fewer features, applications and possibilities. It is the Web as the Internet. Sony is not alone in meaning "Web" when it says "Internet." There are a few companies promising "free Internet," when they actually mean free Web. (By the way, it's only "free" if you do not value your time and are willing to read all the ads that come with these services.)

This simplification is a major part of the future of the 'Net, and we will all lose because of it. We will lose a big part of the ability to innovate and come up with the ideas that will lead to PlayStation10.

Disclaimer: Harvard is still working on Harvard1, so the above is my observation.

*Bradner is a consultant with Harvard University's University Information Systems. He can be reached at sob@sobco.com.*

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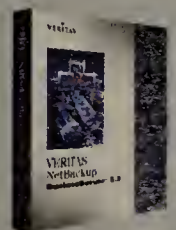
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GnuTAR Compatible tapes	Yes	No
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# Technology Update

An Inside Look at the Technologies  
and Standards Shaping Your Network

## Ask Dr. Intranet

By Steve  
Blass

My company  
has an IP net-  
work address of  
192.168.x.x. Our  
service provider  
reserved the IP  
address of 204.

x.x.x for our use. I have an  
Exchange server, a firewall  
and a registered domain  
name. I don't know what to do  
with the IP addresses so the  
outside world can e-mail me  
at firstname.lastname@xxx.com.

Which IP address should I  
use to set up the Exchange  
server? Which address should  
I have my service provider  
point its DNS to? Do I need a  
proxy server to connect to the  
Internet instead of changing  
everybody's IP address?

Your 192.168.x.x IP network  
uses private IP addresses that  
are not routable over the Inter-  
net, so you will need to use the  
public addresses provided by  
your service provider to set up  
your public services and use  
either a proxy, firewall or  
router to perform network  
address translation (NAT)  
between your private net-  
work and the Internet.

Your firewall should be  
able to provide this function-  
ality. Point your domain  
name to the public address,  
configure NAT on your  
gateway and the mail should  
go through. RFC 1597 de-  
scribes the use of private IP  
addresses.

One useful tutorial is avail-  
able at [www.eclipse.net/  
~amw/tutorial/private.shtml](http://www.eclipse.net/~amw/tutorial/private.shtml).  
Your firewall and/or router  
documentation is another  
good place to look for con-  
figuration information.

Blass is a network architect  
at Sprint Paranet in Houston.  
He can be reached at  
[dr.intranet@paranet.com](mailto:dr.intranet@paranet.com).

## Easing management of storage devices

BY DON SWATIK

As storage area networks  
become more popular and  
expand, so grows the diversity  
of host and storage devices, switches,  
hubs and adapters deployed across a typi-  
cal SAN. The challenge is to effectively  
manage these dynamic SANs and their  
components without adding complexity  
and human resources.

The FibreAlliance, a  
consortium of 40 storage  
vendors, is defining a  
Simple Network Manage-  
ment Protocol (SNMP)  
Management Information  
Base (MIB) to facilitate  
SAN management. Mem-  
bers recognize the need  
to create, maintain and  
manage compatibility  
among SAN components.

SNMP has become the  
management method of  
choice for SANs, mainly  
because it is widely sup-  
ported and can be run out  
of band. One advantage of  
out-of-band management is  
it doesn't rely on the Fibre  
Channel network. If a net-  
work path or component  
fails, that failure could cut  
off the connection to an in-  
band device or manage-  
ment station, preventing a  
timely repair and restora-  
tion of operations. Out-of-  
band SAN management  
allows management from  
any station with an IP  
address. SNMP can also be  
run in-band over Fibre  
Channel.

A goal of the Fibre-  
Alliance has been de-  
ployment of the Fibre  
Channel Management In-  
tegration (FCMGMTINT)  
SNMP MIB. The MIB is a  
group of parameters, or variables, whose  
values define and describe the status of a  
network and its components. The MIB  
provides a heterogeneous method of  
managing multiple Connectivity Units  
across a SAN. (A Connectivity Unit can be  
any type of addressable component of  
the SAN, such as a switch or cabinet full  
of switches.) To ensure the MIB meets the  
needs of potential users and vendors, the  
FibreAlliance is working with the

Internet Engineering Task Force, which  
has posted the MIB as a working draft.  
The MIB is available for review at  
[http://search.ietf.org/internet-drafts/  
draft-ietf-ipfc-fcmgmt-int-mib-03.txt](http://search.ietf.org/internet-drafts/draft-ietf-ipfc-fcmgmt-int-mib-03.txt).

The FibreAlliance is developing and  
submitting the MIB to the IETF in phases.  
Phase I, submitted September 1999, pro-  
vides system-level information, and the  
ability for a net management station to

agement frameworks to provide a consis-  
tent interface to key SAN components for  
subcomponent performance manage-  
ment and subcomponent health monitor-  
ing, without launching into a compo-  
nent's own device manager. Phase III,  
planned for submission in April, will add  
additional versatility.

Storage-management and enterprise-  
management frameworks are the primary  
tools to aid IT operations.  
When using the FCMGMTINT  
MIB, these frameworks will let  
administrators monitor the  
SAN topology for perfor-  
mance, health, configuration  
management and growth.

These frameworks typically  
depict a graphical topology of  
the SAN, based on information  
retrieved from the framework  
server. That server communi-  
cates with the SAN devices via  
agents and SNMP GET com-  
mands. In configurations  
where the SAN device has its  
own subnetwork, there is a  
proxy for the SAN devices con-  
nected to it. Management  
framework programs often dis-  
play color-coded icons for  
devices and links for the paths,  
where color identifies prob-  
lem areas.

Automatic topology discov-  
ery is accomplished by send-  
ing a Request Node Identifi-  
cation Data (an in-band Fibre  
Channel protocol) to other  
Connectivity Units, where the  
returned IDs are stored in a  
link table on the SNMP agent  
in the requesting Connectiv-  
ity Unit. Each Connectivity  
Unit's link table contains the  
IDs of every other device con-  
nected to that device. Link  
tables allow the framework  
server to gather identifying  
information from the agent  
devices. The ability of Con-

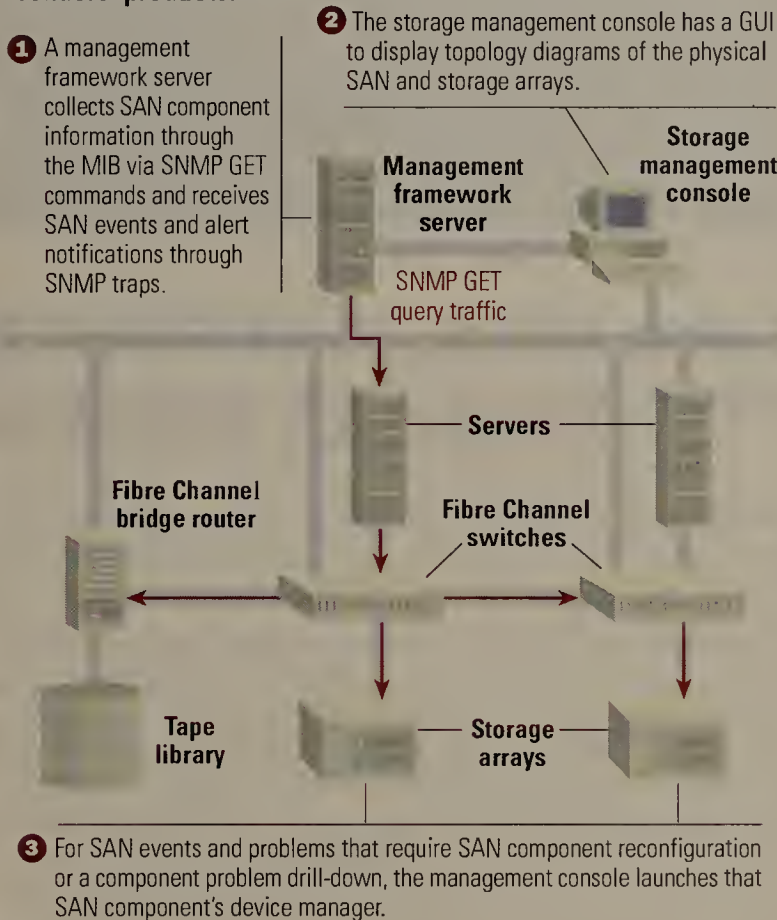
nectivity Units to gather topology con-  
figuration information and SNMP traps  
from connected devices greatly reduces  
the overhead required in the framework  
server to retrieve information for all SAN  
components.

Don Swatik is vice president of prod-  
uct management at EMC, a storage  
vendor in Hopkinton, Mass. He can be  
reached at [swatik\\_don@emc.com](mailto:swatik_don@emc.com).

## HOW IT WORKS

### Storage area network management

The Fibre Channel Management Integration MIB provides for out-  
of-band SAN device management, along with in-band management  
methods that utilize SNMP agents and APIs, letting a storage  
management framework from a single vendor manage many  
vendors' products.



launch third-party management applica-  
tions on Connectivity Units by accessing  
the URLs of those devices. This allows  
those Connectivity Units to obtain infor-  
mation from connected devices for re-  
trieval by the net management station.

Phase II, submitted in December 1999,  
adds the ability to gather statistics from  
Connectivity Unit ports, autodiscovery of  
SAN components and environmental sen-  
sors, such as heat. Phase II allows for man-





Gearhead — inside the network machine . Mark Gibbs

## DOWN AND DIRTY UNIVERSAL SERIAL BUS

Last week, Gearhead started to delve into the mystery that is the Universal Serial Bus (sounds so much more dramatic that way). We discussed

hubs and power issues and concluded by noting that USB cables aren't just any old cables.

So, what kind of cables are they?

Actually, pretty simple. They consist of four wires: two power lines (called "Vcc" for power and "Gnd" for the ground) and two signal wires (called

"D-" and "D+"). If the USB I/O device isn't self-powered, the PC or hub it connects to will supply the power. In the case of the latter, the hub itself must be a powered device (some aren't).

As we also noted last week, USB cable ends have different connectors depending on whether they plug in to a PC or a hub connected to a PC (called an upstream connection) or plug in to an I/O device or a hub that is connected to an I/O device (called a downstream connection). With both types of connectors, the power pins are longer than the data pins to ensure that power is available before a signal is passed to the connected device.

USB cables can be a maximum of 5 meters, and the maximum data rate is 12M bit/sec. Actually, USB supports two data rates: 12M bit/sec and 1.5M bit/sec, and devices signaling at different rates may be used in the same system.

We discussed last week how USB uses a master-slave architecture, and the PC operating system is responsible for managing the two USB states: initialization and run time. The initialization process runs continually so that devices can be plugged in and unplugged while the system is "hot." This is, to say the least, a huge convenience for users because they don't have to worry about shutting down devices to remove them or restarting their PC to add new peripherals.

USB signaling uses a packet-oriented token-based protocol with four different packet types: token, data, handshake and special. Token packets are passed between devices to permit data transfers. Handshake packets acknowledge data packets, and there's one special packet that is used to signal that the data transfer will be at low speed (1.5M bit/sec). Each packet type has several subtypes.

If you would like to read about the in-depth technical details of USB, Gearhead recommends "USB Design by Example" by John Hyde, which will tell you more than you ever wanted to know.

In USB's early days, its implementations were riddled with incompatibilities and odd behaviors that left many users and IS professionals with negative feelings. Some PC vendors shipped machines with USB services switched off because there weren't many USB devices available. That caused a lot of confusion. There were also software and hardware problems, but wider availability of USB devices and improved support in Windows 98 Second Edition improved things vastly.

Today, USB can't be described as flawless, but even so, it's the best general peripheral support technology we've got, and when it works, it works fantastically well.

Next week, more synthetic talking. Sound off to [gb@gibbs.com](mailto:gb@gibbs.com).

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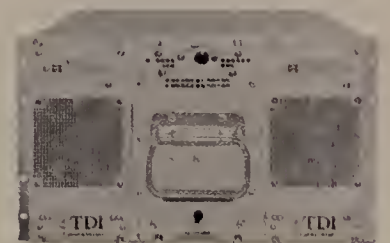


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## Editorial

### Sizing up voice over IP

One key to getting ahead in this business is developing a knack for knowing when to invest in new technologies. After all, early adopters get burned, while laggards get whacked upside the head by more nimble competitors.

By some accounts, voice over IP is one of those technologies that is still too far away to worry about. But after attending a Net Events forum on the subject two weeks ago (see [www.netevents.org](http://www.netevents.org)) and visiting CTE expo, it is clear the voice-over-IP movement is gathering momentum. One telltale sign is that industry discussion has begun to swing away from the bits and bytes to how the technology can solve problems.

Vendors talk about how voice over IP will enable road warriors to use laptops with soft phones to log on to corporate networks from hotels. Once connected, they can check e-mail and voice mail, dial colleagues via their extensions and even receive incoming calls as if they were back at their desks. And all of this for the cost of a local call.

In hospitals, warehouses and universities where people move around a lot, a slew of wireless, IP-based data/phone devices will emerge. A nurse, for example, will be able to use a handheld to scan a patient's bracelet and his new medicine, initiating a database lookup over a wireless link. If incompatibilities are detected, the nurse can use the built-in phone to place an IP call, saving time and money.

Symbol Technologies says it has a university customer that leases laptops and handhelds to students who can use the school's wireless data network to access various resources. Stirring in IP-enabled voice and charging a small fee will give the school a new revenue source.

A driver in more conventional settings will be savings on moves, adds and changes — down from \$150 to \$250 today to practically zero because the network can figure out where you are. Some calculate that converged infrastructures will cost 30% less to run than separate voice and data nets.

While all of this sounds exciting, the Stamford, Conn., network consultancy Gartner Group says the actual migration will be slow, predicting that converged systems will only account for 13% of voice system sales by 2003.

Nevertheless, it seems like it's time to pay more attention to voice over IP. Consider this: One vendor I visited says it is talking to a county government about deploying 800,000 IP-based phones.

— John Dix  
Editor in chief  
[jdix@nwm.com](mailto:jdix@nwm.com)



Message Queue

### LEGACY LINGERS

Regarding Linda Musthaler's column "New breed of legacy-free PCs is easy to love" (Feb. 28, page 51):

If there are no PCI slots, what are we going to use to hook up our sound cards, modems and network interface cards? If you tell me they will all be on the motherboard, we all know that onboard components don't work as well.

Universal Service Bus (USB) is expensive, too. A USB keyboard sells for three times the price of a PS/2 keyboard.

USB is good for some things, but getting rid of expansion slots is a joke, and it's not going to happen.

Tim Hodges  
Student  
Fanshawe College  
London, Ontario

*Musthaler responds: Perhaps that's why some vendors are taking the approach of a "legacy-light" PC. They are making some changes to the PCs, such as eliminating parallel and serial ports on the outside, to reduce costs and make them simpler, but keeping the traditional expansion slots on the inside.*

*At some point, the add-in cards, such as modems and audio ports, will make the transition to USB, and prices will come down on keyboards and other components. It took nearly 20 years for the PC to get to the state it's in today, so we can't expect changes overnight. But I do see it happening over the next year or two.*

I have reviewed some of the data on the period at Johnson Space Center that Linda Musthaler talks about. I would like to point out (with the 20/20 hindsight that is the pleasure of all critics) that it was foolish to expect a "standard" to be prevalent or even do-able at that time. The PC industry and Microsoft had no rational plan in general and no specific standards to focus on. Even with standards and a plan, you would have

found companies like Microsoft building software that would require new standards in storage, if not in CPU power, RAM and video capabilities, in 24 to 36 months.

It is much the same today, and Musthaler's column is stuck in the same extremely shallow thinking with one new twist: She doesn't seem to realize that she is describing a focus in technology that already has a name. It's called an iMac.

Victor Nazarian  
Information systems manager  
United States Institute of Peace  
Washington, D.C.

### MIXED NUTS

Regarding Mark Gibbs' "Backspin" column "Nut behind the support call" (March 6, page 82):

I haven't heard NBW (Nut Behind Wheel) used to refer to the receivers of tech support. The two terms I've heard of late: PEBCAK (pronounced "pebsack") and LUser. The latter is obvious; the former is an acronym for "Problem Exists Between Chair And Keyboard."

Stan Coffield  
Network systems analyst II  
Town of Huntington, New York

I have been in hardware support and repair for 12 years now, and have probably seen just about everything there is. My advice to Mark Gibbs regarding his frozen display problem: Read carefully and quit blaming Windows.

Make sure you have sufficient memory, and buy a video card that works. If you have to turn down the accelerator at all, it should be a clue that you got a good deal when you purchased your computer. Compaq, HP and various other manufacturers are famous for giving good deals. They throw the video and a host of other hardware necessities on the main motherboard in hopes of saving themselves a dime. The savings are passed on to you.

Put a Matrox G400 graphics card in your machine, throttle that accelerator to full speed ahead and you will be good to go.

Charlie Diebel  
Little Falls, Minn.

Send letters to [nnews@nwm.com](mailto:nnews@nwm.com) or John Dix, editor in chief, Network World, 118 Turnpike Road, Southborough, MA 01772. Please include phone number and address for verification.

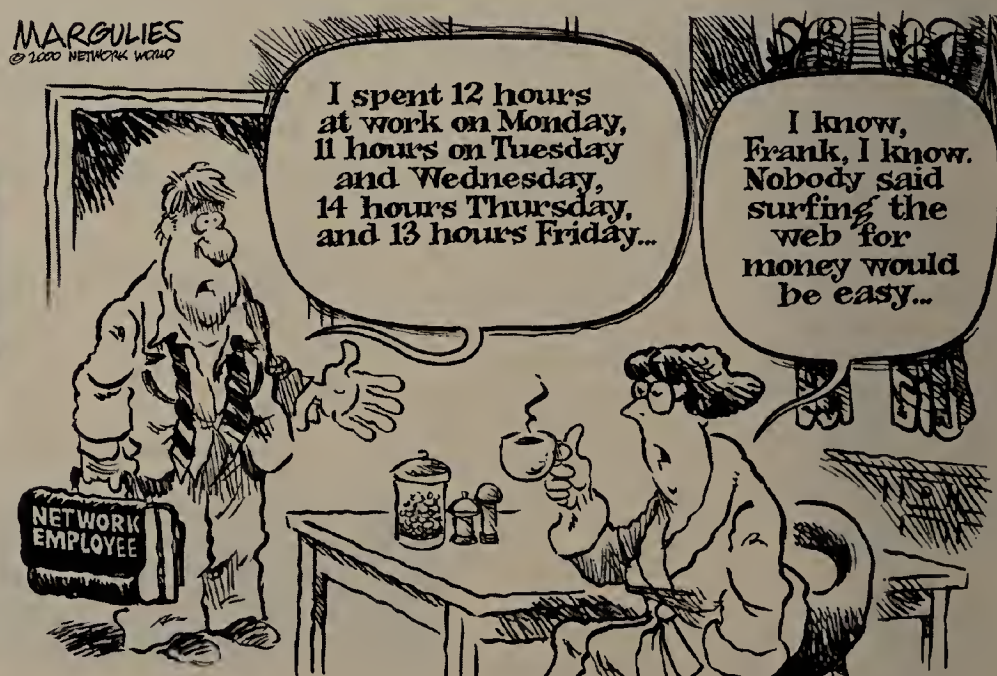
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## COMMON CRITERIA FOR INCREASING CONFIDENCE IN SECURITY

In the wake of recent denial-of-service attacks, companies are spending millions on security gear. But can you be confident the products will work as advertised?

To ensure a positive answer to this question, vendors including Cisco, Check Point Software, Lucent, IBM and Oracle have begun specifying the security features of their products according to the Common Criteria (CC) — a new security standard that provides a common way to state both consumers' security needs and products' security specifications. These products are then tested at a new breed of accredited commercial security testing labs, which independently verify — at a specific level of confidence — that the products conform to their security claims.

The CC includes a two-part catalog of basic requirements for security functions and for assurances about the proper implementation of these functions. Consumers use the catalog to develop profiles of their security needs and state the level of confidence they want in the products they're looking to buy. Vendors use the CC to define their products and show how

they meet the consumers' requirements. Testing laboratories use common test methods from a companion CC standard to verify that vendor security implementations are correct, complete and compliant to specifications. And the National Information Assurance Partnership — which helped author the scheme for using the CC — can validate testing results and "brand" successfully tested products for international markets.

At the First International CC Conference this May (<http://niap.nist.gov/cc-scheme/iccc/program.html>), many of the world's biggest IT building and buying nations are expected to sign multilateral agreements embracing the CC specification, testing and validation scheme. These agreements will allow vendors from any country to sell their wares with CC certificates in foreign markets with no product retesting — a benefit to both vendors and consumers.

The financial world is using the CC scheme to build confidence in its electronic services, simplify security product comparison and reduce testing costs. Led by Visa, the major credit card companies and smart card vendors are drafting CC-based profiles of security requirements for smart cards and common test suites

to unify the current hodgepodge of customer/vendor-specific testing.

The health care sector is following suit. Vendors and providers can use the CC scheme to demonstrate their compliance with new patient information privacy laws associated with the Health Insurance Portability and Accountability Act. This will reduce liability, according to Gartner Group.

The telecom marketplace is eyeing the CC for improving consumer confidence in the security features of PBXs and telecom switches that interact with the Internet. The feds are also turning to products tested according to the CC scheme.

While nothing's a panacea in the security world, being able to buy security products that provide the level of confidence you want is a giant step in the right direction. Trust in security and privacy products is what will facilitate the growth of electronic commerce and services for all types of enterprises.

*Brusil is a freelance security and network management consultant in Beverly, Mass. He can be reached at [brusil@nist.gov](mailto:brusil@nist.gov).*

## IT'S TIME TO RETHINK THE PREMISES NETWORK

For a long time, the evolution of the LAN and the evolution of the user's service relationship with carriers and WAN technology have developed almost independently. This may change soon, because interest in IP virtual private networks (VPN) and the Internet, coupled with equipment vendor desire to increase revenue, are

threatening to blur the LAN/WAN boundary forever.

When Level 3 (and higher) LAN switches were introduced, some vendors realized their products could replace routers, which are also Level 3 products, and offered WAN interfaces. The "we'd like to be

your router" mission — the keystone of the marketing approach of vendors such as Xylan (now part of Alcatel) — didn't encourage the switch vendors to propose any unique LAN architecture. Instead, the message was "whatever you did with your routers, you can do with our switches."

But the trend toward WAN features on switches is also dovetailing with some key issues in the delivery of IP VPN services. In their early deployment, IP VPNs are most likely to supplement private networks rather than completely displace them. Getting LAN traffic to the right WAN connection (VPN or private network) involves building switched-LAN networks and integrating high-level LAN switching with VPNs. This fact ultimately will force switch vendors to address just how their products should be used to build the optimal

LAN/WAN network.

The problem is that VPNs may represent special handling options for traffic involved in applications such as collaborative conferences, which require high quality of service. The conferees all have their own system addresses, and those addresses don't change just because the participants happen to be using NetMeeting. What happens is the traffic between the collaborators gets prioritized for the period of the conference.

But how does that traffic get to the VPN? The VPN may well be connected to the LAN in a different spot than the private network is connected. If the routing tables in premises LAN switches or routers point to the private network as the route between the IP addresses of the conferencing users, none of the traffic will ever get to the IP VPN's service point.

One strong step that can be taken to prevent difficulties in getting traffic to a VPN service connection is to build premises networks with a single WAN connection point for all traffic, whether it's to a private network or an IP VPN. If all WAN traffic flows to a common exit point, only the device there needs to be made aware of the policy management steering rules that direct collaborative conferences one way and simple e-mail or other data activity another way. But while most LAN vendors would endorse this rule, few make it a recommendation in their design guides.

A more complex problem in the LAN/WAN relationship is how Level x (where x is 4 through 7) LAN switches, which are application-aware by nature, are linked to IP VPNs, which may also be

application-aware. If we go back to our conference example, we could assume that the LAN switches create a policy-based application network within the premises LAN for local user conferencing. Wouldn't it be logical to assume that a VPN service for connecting off-site members would be effectively "joined" to this application network? This would permit policy management exchange between the application and the service provider, if needed, and also ensure that the VPN is used only for the application for which it was procured. Unfortunately, that isn't how the switch vendors are promoting their WAN interfaces.

Linking Level x switches to IP VPNs isn't just a problem for big companies, either. A small office LAN is a single, flat, structure consisting of a single subnet, and any traffic to anyone not on that local subnet goes to a common default gateway router. It's true that the small office LAN probably won't have a problem with a separate WAN connection for private networks and VPNs. But it could well support internal application networks built through Level x switches, and these networks may have to be extended off-site.

The introduction of VPN services, particularly those targeted at applications rather than whole networks, could expose many users to issues of LAN/WAN integration they've never seen before. Now is the time to bone up on your vendors' capabilities in this area before it's too late.

*Nolle is president of CIMI Corp., a technology assessment firm in Voorhees, N.J. He can be reached at (856) 753-0004 or [tnolle@cimicorp.com](mailto:tnolle@cimicorp.com).*







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# THE PDA PREDICAMENT

***IT knows how to issue devices to end users, but what happens when users take matters into their own hands?***

BY SHARON GAUDIN

**P**ersonal digital assistants (PDA) are no longer just the geek's favorite gadget. In an era when real-time information is the lifeblood of business, and everyone from the sales rep to the CEO is virtually useless unless they're connected, the PDA is fast becoming a necessary tool for enterprise.

Millions of employees have rushed out and bought the latest PDAs.

Souped up with wireless connections, increased power and enhanced Web capabilities, the devices are quickly becoming part of what industry watchers are calling a worker's personal computer network — a seamless web of desktops, laptops, handhelds and smart phones.

The problem, from a network executive's standpoint, is that this unmanaged proliferation of PDAs could become a major drain on staff time and on your

budget, unless you put some firm policies in place.

Jack Gold, senior program director for Meta Group in Westborough, Mass., says very few companies have thought through the network requirements associated with PDAs. "There's going to be a lot of changes. The help desk is trained in PCs. They don't know why your Palm isn't syncing. You've got to provide some standardization in the face of a vast array of device types. You've got to figure out sizes, connections and speeds. You've got to figure this all into the budget and make sure people have time to do the extra IT work."

## Who buys them?

The first issue that comes up with PDAs is whether the company should purchase them. Most of the PDAs out there today were purchased by employees, but the tide seems to

be turning.

In an online survey conducted by *Network World*, 88% of network executives said their companies did not issue PDAs, but 61% said their companies would be issuing them as standard equipment within two years.

Russ Wells, chief information officer at Trans-Canada Pipelines in Calgary, Alberta, Canada, says his company has issued a Palm Version 3.0 to about 30% of its approximately 5,000 employees. "It's a way for people to stay connected and organized. We're looking to improve productivity with them."

Econometrics, Inc., a data warehouse marketing firm in Chicago, issues Palms as it does pagers, laptops and cell phones. "If they're doing business, if they're on the road a lot, they need to be armed with as much as they can," says chief technical officer Brian McGuire.

Ken Dulaney, vice president of mobile computing at Gartner Group's San Jose office, says most companies face a sharp learning curve when it comes to PDAs. "Most companies today still don't buy them," he notes. "They don't track them. They don't have any idea at all. But we're only two to three years away from 50% of companies issuing them. That's going to be a big swing for IT."

## Who fixes them?

Isaac Applebaum, CEO of Concorde Solutions, the Concord, Calif., IT division of Bank of America, is hooked on his own PDA, but says he's not ready to start issuing them to employees.

"The technology is still a little bit raw, a bit slow," says Applebaum. "Six months from now even, I'm hoping it's better and faster. Then absolutely, we could be doing that."

But before Applebaum does any deployment, he plans to consider the impact on his IT staff. "I don't know how much time we have to keep track of them or even to maintain them. My people have enough to do. . . . If I get a cell phone, I figure out how to use it. If it breaks, I deal with that. That's how we've always done it, but I guess that will have to change."

On the other hand, Econometrics' McGuire, who has been handling his company's PDA deployment for several months, says the impact has been minimal. "The Palm is a no-brainer. We haven't had any kind of learning curve yet."



DAVID PETERS



## PDA POLICY PUNCH LIST:

### HELP USERS PICK THE CORRECT PRODUCT.

There are distinct user profiles for each device. Incorrect product choices mean users end up with a drawer full of devices at the organization's expense. Determine whether a user is more interested in e mail or personal information such as contact lists and schedules, then buy accordingly.

### ONE OPERATING SYSTEM STANDARD DOESN'T FIT ALL.

Establishing standards is a good idea, but recognize that users may receive them as gifts or purchase them from departmental budgets. Being totally realistic, don't expect that a single personal digital assistant (PDA) model will ever be adopted.

### ONE SYNCHRONIZATION STANDARD DOES.

You can move to standardize on one of several emerging synchronization products that support a variety of devices.

### RECOGNIZE THE INCREASED IT COSTS.

You should be prepared for increased costs based on the understanding that each computer in possession of a user has significant fixed costs regardless of price. Also, the more computers each individual employs, the greater burden on IT support.

### UPDATE MOBILE DEVICE POLICIES — KEY ITEMS TO CONSIDER:

- **Supported applications:** With consumer oriented handhelds come a plethora of applications not usually supported within the IS organization. While IS may want to support some common ones, others simply put too great a burden on support staff due to their "consumer" nature.
- **Data security:** Policies must be in place to safeguard corporate data on personally owned machines. Data ownership can become a gray area and must be clearly articulated. Sometimes purchasing the devices for employees may be the best course of action to ensure ownership. All data maintained on mobile devices should be backed up to corporate resources.
- **File formats:** Many consumer mobile devices have proprietary file formats. Any device supported must have a well understood translation facility to move data to the standard formats employed on the desktop.
- **Procurement relationships:** The IS organization should encourage mobile device purchases from vendors with which there is an existing relationship.
- **Third-party service relationships:** In many cases, consumer mobile devices are "throwaways," that is, the cost of repair is often more than price of new equipment. You have to decide whether service contracts are worth it.

Of course, we're not using any customized applications. That would give us something to think about, but if there's a problem with the Palm, there really can only be a few things wrong with it."

In our survey, 76% of respondents said PDA maintenance is not currently part of the help desk budget. And 63% said the help desk had not been trained to respond to PDA problems.

### Who owns the information?

Another key issue is determining who owns the information on the devices. Most network executives say if the company buys the device, the company owns the information. They also say if the employee buys the device, the company still owns the information, if it was gathered in the course of the person's job.

"That's like an employee copying data off a network and putting it on a floppy. It's still the company's information," says Mike Riley, director of ETechnologies at R.R. Donnelly & Sons Co. in Downers Grove, Ill. "The content on that device belongs to the company. Getting it back is the problem. That's one of the reasons why we haven't moved forward in formally supporting

handhelds. We have to have a tool and a methodology to get that information back."

For example, Wells has set policies making it clear to employees that the company owns whatever information is on the devices and that personal information is to be kept off them.

Meta Group's Gold has a different opinion. He says if the company doesn't own the device, the company doesn't own the information.

### Who protects the information?

Gold adds that network executives will be spending a lot of time trying to figure out how to keep information out of competitors' hands. In fact, our survey showed that by a margin of 64% to 29%, network executives believe PDAs pose a security concern.

"Security is only as good as the security on the devices and right now that's pretty much just a password," Gold says. "What happens if I leave it in a phone booth when I'm running to a plane and my competitor picks it up? If I'm the top salesman in my company and I have my top 100 contacts on there, the company could lose millions of dollars in sales."

Gartner's Dulaney agrees, calling PDAs a company's biggest security threat, ounce for ounce. And he says that security threat will only increase as more and more devices gain wireless capabilities and can link up with the company's network, giving hackers another avenue into the company's treasure chest or another vein to feed viruses into.

Alexander Cruz, account manager at Applied Theory Corp. in University Research Park, N.C., who is conducting pilot testing of PDAs, says, "Security is the first and foremost issue. How do you allow an employee to sync corporate information and have the ability to walk away at the end of the day or leave the company with company-sensitive information?"

Cruz says PDAs are issued in the company's Charlotte office on an as-needed basis, with most going to the sales team. And while the company is considering AvantGo for PDA-based applications, it hasn't yet standardized on a device, using everything from Palms to Hewlett-Packard's Jornada.

For now, Cruz says, employees are only allowed to sync information with a laptop and cannot connect via PDA to other parts of the network. He's working on policies covering everything from device standards to connecting with the company's intranet for instant access to corporate bulletins, announcements and newsfeeds.

R.R. Donnelly & Sons' Riley says he's not only worried about a PDA falling into the wrong hands, but he's worried about a wireless device, like the Palm VII, sending critical information out beyond the network's control. "As memory capacity grows and the ability for communication [with these devices] grows, how do you keep track of what could be sensitive corporate data?" he asks. "It's difficult to track where that data goes and what happens to it."

But a lot of corporate users say security on PDAs is improving, and they expect comprehensive encryption capabilities, and eventually biometrics, to replace minimal security methods, like passwords.

"We're always concerned about security," says Wells. "But whenever I think about these devices, I think about a salesman losing an appointment book, and that's certainly not encrypted. We'd like there to be more security... and the technology will continue to improve. I'm not afraid to give our salespeople Palms."

"You figure this is all going to happen to you anyway," Wells continues. "It's coming. You just have to figure out how to manage it." ■

www.nwfusion.com

## PDA RESEARCH ONLINE

Primer: A beginner's guide to PDAs.

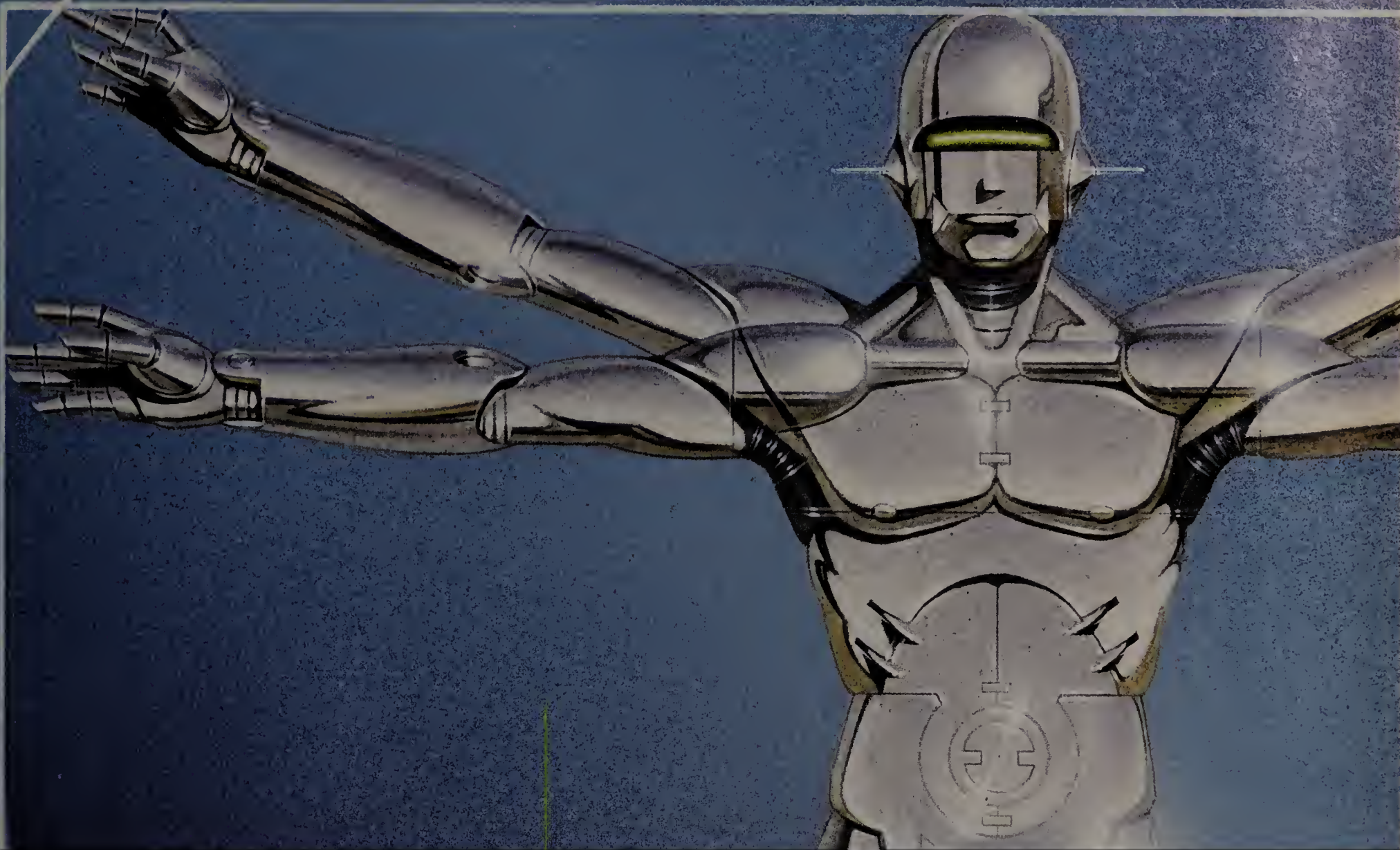
White paper: Learn the ins and outs of PC Cards.

Links: An extensive list of PDA-specific publications and newsletters.



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# PDA FIELD GUIDE

## COMPAQ AERO 1530

**Street price:** Around \$300

**Who would want this?** A mobile worker who lugs around a lot of devices (cell phone, PDA, laptop) and wants a lighter alternative.

**Pros:** Ultrathin design and light weight makes it easy to carry, easy-to-push buttons, metal stylus has a good feel to it.

**Cons:** Can't adjust contrast, gray-scale screen might turn off some.

**Coolness factor:** Silver frame gives it a sleek look. Thin is always in too, but no fancy bells and whistles hurts with the "ooh" factor.

**Bottom Line:** A functional PDA at a good price – may not impress the sales staff, but it's still cool enough to impress others.



## The latest in the world of personal digital assistants.

BY KEITH SHAW

Bob from Sales comes in and says, "Hey Joe, you have to buy me and my staff a bunch of Palm Pilots. Now. We need them. Really."

Before you fork over half of your equipment budget for fiscal 2001, check out our guide to what's hot, what's not and what will make Bob happy.

We invited the leading vendors of personal digital assistants (PDA) to send us their latest and/or greatest offering. We fiddled around with the settings, kept them on our desk, dropped a few of them (accidentally) and now present this guide.

A thorough examination of each device is located on Network World Fusion. (DocFinder: 7321)

### The Windows CE vs. Palm OS debate

The debate over Windows CE vs. Palm OS is somewhat like the Windows 2000 vs. Novell Directory Services debate, or the Windows vs. Linux debate, or the Windows vs. Unix debate (sense a pattern here?). For several reasons, both real and imagined, there are people out there who don't like Microsoft and would refuse to work with anything that they produce. If that's the case, look at the Palm OS devices.

At the start of the testing phase, we found that the Windows CE devices were somewhat easy to work with, as long as you were comfortable with Windows. But then the Palm OS devices arrived (The Handspring Visor and the two Palm units), and blew us away. The Palm OS uses a much more intuitive icon menu system to get to the programs you want, installing add-on software is much simpler and the system is more stable (We had to reset the Windows CE devices several more times than the Palms). Also, the ton of available add-on software for the Palm OS gives it an edge over Windows CE.

### Features decisions

Once you've decided which operating system to go with, take a look at the features for each machine and decide what your staff wants to accomplish with the PDA. All the devices can handle contacts, calendars, to-do lists and other personal information management functions. But what if you need them to upload e-mail quickly or instantly? What about access to spreadsheets or other heavy-duty applications? Deciding how you want your staff to use their PDAs could go a long way in determining which system you finally choose. Of course, price is always an option and there are some clear choices in that area.

Finally, if you have the budget and want to make Bob happy, we've listed the "coolness" factor for each PDA so they can impress their clients or friends or family with their new "business toy."

## PALM IIIxe

**Street price:** \$250

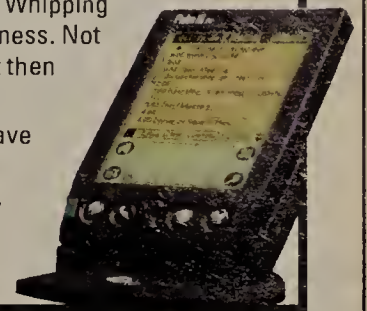
**Who would want this?** Everyone on your staff who wants a PDA but can't afford a Palm V or Palm VII.

**Pros:** All of the benefits of the Palm OS, more RAM than the Palm III, tons of software available, price on a par with the Handspring Visor.

**Cons:** Not as cool as the Palm VII

**Coolness factor:** Very cool. Whipping out a Palm Pilot oozes coolness. Not as cool as the Palm VII, but then not as expensive either.

**Bottom line:** The Palm to have if the Palm VII and Palm V are out of your price range, and you want the Palm brand name.



## CASIO CASSIOPEIA E-100

**Street price:** Between \$450 and \$500

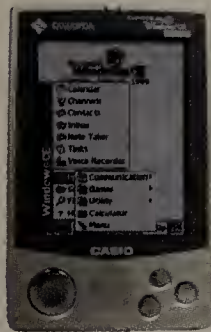
**Who would want this?** Executive who wants to flaunt the color screen, multimedia and audio features of Windows CE.

**Pros:** Vivid colors, comes with lots of software including movie file player, writing on the screen much smoother than others.

**Cons:** Ran slower than other Win CE devices, hung up more.

**Coolness factor:** Very cool – Silver frame very sci-fi, looks like an old-style Walkman, color quality will impress.

**Bottom Line:** If you're out to impress someone and don't mind Windows CE, this is the PDA to get.



## HANDSPRING VISOR DELUXE

**Street price:** \$249

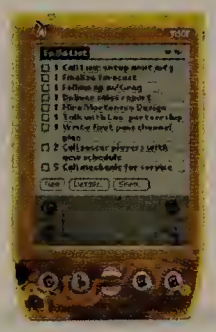
**Who would want this?** Budget-conscious manager who wants the Palm OS at a lower price, and a PDA that can "evolve."

**Pros:** Inexpensive, compatible with Palm applications, lots of software available, expansion slot has potential for future applications; docking cradle connects via USB port.

**Cons:** Monochrome screen could be a turnoff, the iMac-ish frame colors might turn off some.

**Coolness factor:** Very hip if you want a color frame and like the Palm OS.

**Bottom Line:** The expansion slot holds promise for future applications, and the price can't be beat.



## HP JORNADA 430

**Street price:** Around \$500

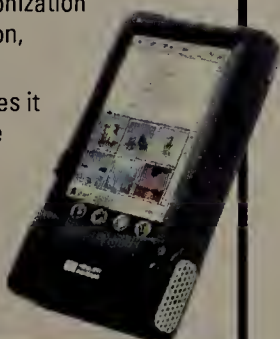
**Who would want this?** An executive who wants to impress people with the color screen and then go home to download MP3 music or digital photos.

**Pros:** Color screen improves some Windows CE functions, includes MP3 software and image viewer.

**Cons:** Instead of a cradle, synchronization and power charger are snapped on, which is awkward.

**Coolness factor:** Color screen gives it extra hipness, but the black frame and boxy feel make it look like a portable tape recorder.

**Bottom Line:** Pricy compared to other PDAs, MP3 software and photo viewing attractive to consumer audience.



## PALM VII

**Street price:** \$450

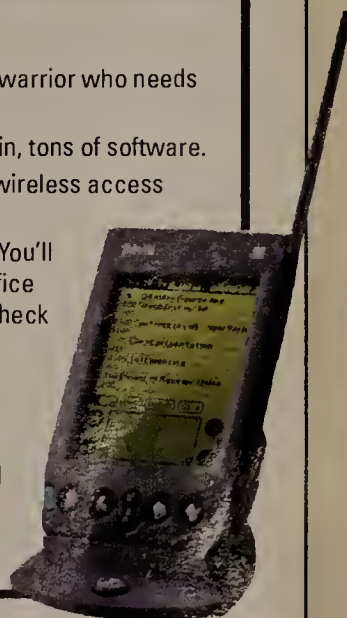
**Who would want this?** The road warrior who needs instant e-mail or 'Net access.

**Pros:** Wireless 'Net access built-in, tons of software.

**Cons:** An expensive device, and wireless access can add to the cost.

**Coolness factor:** Extremely cool. You'll be the envy of everyone in the office when you flash this baby out to check your e-mail or the latest stock quotes.

**Bottom line:** The Rolls-Royce of PDAs. But the luxury comes at a price – if your staff doesn't need the instant e-mail access, why pay for it?





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# FEATURE: THE CHALLENGES OF A

# WIRELESS WEB

**Web clipping and wireless application protocol (WAP) offer new ways to overcome limitations inherent in wireless Web connections.**

BY THOMAS POWELL AND JOE LIMA

**T**he era of the wireless Web is fast approaching, driven by a plethora of new devices offering "anytime, anywhere" access to Internet-based content and services, and by the maturing of digital wireless technologies and standards.

However, before the wireless Web becomes a reality, two fundamental constraints need to be addressed: the limitations of wireless devices, and the limitations of wireless networks.

The first problem is that wireless devices are significantly smaller and less powerful than laptops or PCs. Their functionality is limited by tiny displays, cramped keypads, slower processors and less memory.

Furthermore, the radio networks that connect these devices to the Web compare unfavorably with landline systems in terms of airtime costs, bandwidth, network availability and quality-of-service features such as latency, signal interruption and data loss.

However, various attempts are under way to get around these limitations. The most promising are a Web clipping technique introduced by Palm, Inc., and the growing acceptance of the wireless application protocol (WAP).

With Web clipping, which is used on the Palm VII wireless personal digital assistant (PDA), a customized wireless application is written and deployed in two parts: a Web-based back end, which serves the dynamic content, and a Palm Query Application (PQA), which lives on the Palm VII itself.

The server side of the application can be implemented using any of the standard technologies for database-driven, dynamic Web sites, such as Common Gateway Interface (CGI), parsed HTML and server APIs. However, the pages you serve must use a restricted subset of HTML 3.2, which means you can forget about fancy stuff like style sheets, image maps, frames, nested tables, cookies and client-side scripting.

The PQA is written in a "compiled" form of this same restricted subset of HTML and contains the relatively static user-interface elements needed to retrieve, update and display content (including images). The PQA gets onto the end user's device through a synchronizing operation just as a standard Palm application would, and once in place, it behaves much the same way—right up until the moment the user attempts to

submit or retrieve new data.

At that point, a request is sent over a proprietary air link to a Palm proxy server, which in turn relays it, via standard HTTP, to the part of the application that lives on a Web server. The response retraces this route, from HTTP to Palm proxy and back out over the air link to the mobile device.

In effect, the PQA goes out and takes a "clipping" from the Web site with which it is permanently associated. Imagine, for example, that you needed to give your sales force access to the inventory, pricing and customer account information that lives on your corporate intranet. To do this with Web clipping would mean writing and distributing a PQA that contains all the menus and forms needed to input and output the data. Your servers, meanwhile, would host the extra files required to build the clipings on the fly, using Allaire's Cold Fusion, Microsoft Active Server Pages or CGI.

The advantages and disadvantages of Web clipping stem from the same source — the physical separation of static elements, presentation, from dynamic ones, content. On the one hand, Web clipping keeps the costly wireless transaction to a minimum: Only the information that needs to be updated is sent over the

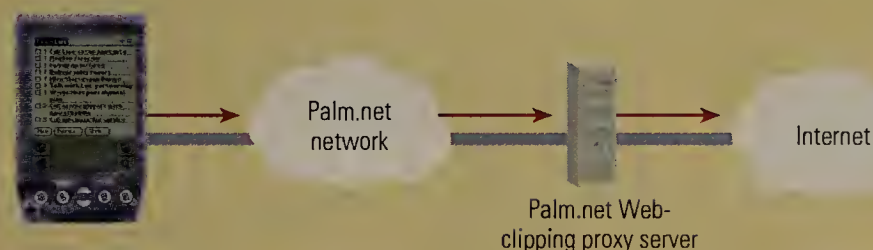
radio network, while the parts of the application that do not need to change (or not so frequently) reside on the device itself. Users get the benefit of access to a powerful, Web-based back end without the performance penalty of having to download bulky Web pages over the air.

The downside is that all interactions with the Web site must be planned ahead of time. Introducing a new form, for instance, would require writing and compiling a new version of the PQA — not to mention getting all your users to reload it onto their devices.

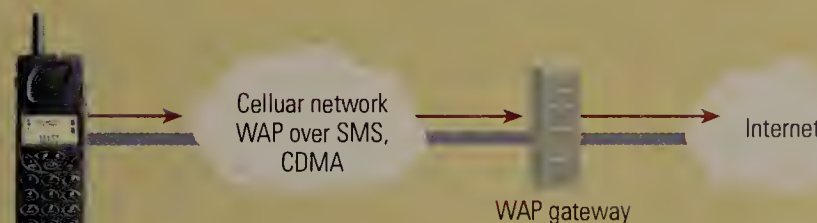
Nor can users freely browse a large site on their own to find what they need. Such restrictions are inherent in the Web clipping model, which is optimized for short, highly structured types of transactions, such as checking on inventory and pricing, submitting orders at points of sale or accessing cus-

## Three wireless ways to the Web

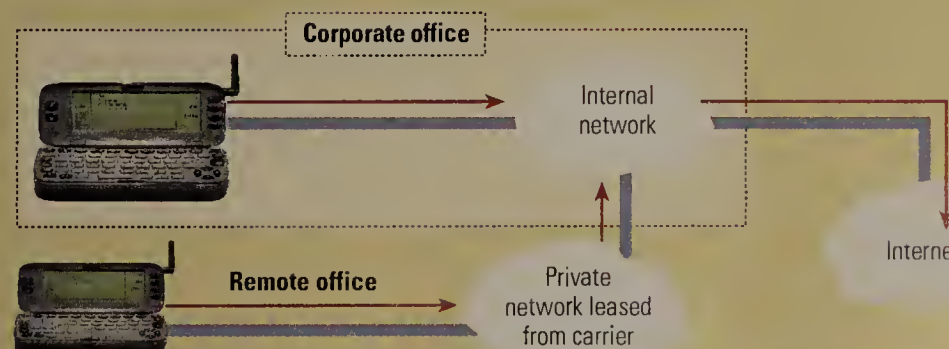
**A Palm VII user** establishes a wireless connection with Palm.net network. A Web-clipping server scales down the HTTP content for the Palm format, and sends it back to the user.



**A cell phone user**, with a phone equipped with a HDML/WML minibrowser, calls a cellular network, and is routed to the Internet through a Wireless Application Protocol (WAP) gateway.



**PDA users** inside a building establish a wireless connection to the LAN, and from there to the Internet over a leased line. Remote PDA users dial in to the LAN remotely for 'Net access.





customer care or technical support information from the field.

## The WAP solution

WAP is a global industry standard for bringing together wireless telephony with Internet content and services regardless of wireless network architecture or device type.

When it comes to linking digital cell phones to the Internet, WAP has quickly become the dominant model worldwide, and it's no wonder. Although the technical impetus for WAP came largely from a relative newcomer called Phone.com (formerly Unwired Planet), the organization responsible for defining and promoting the standard, the WAP Forum, included among its founding members Nokia, Ericsson and Motorola. The resulting promise of interoperability has been key to WAP's appeal.

Because WAP is designed to work with any type of underlying wireless network architecture, it frees you to concentrate on the wireless application itself — without having to worry, for example, whether something written for European customers will also work with devices common in the

more fragmented North American digital cellular market.

WAP provides something analogous to the familiar TCP/IP protocol stack used on the Internet and in corporate intranets. The difference is that the WAP protocol stack is specifically designed to accommodate the special challenges of wireless networking.

## The WAP protocol stack

The application layer of this stack, called the Wireless Application Environment (WAE), presupposes a user agent — the wireless terminal or client, equipped with a microbrowser. Also included in the WAE is an XML-based markup language called Wireless Markup Language (WML). Through the protocol stack, the WAP client communicates with a server called a WAP gateway.

A WAP gateway server sits between the wireless carrier's network on one side and the public Internet or corporate intranet on the other — gateways can be located within carrier or corporate firewalls, or both. In addition to taking care of various housekeeping chores so that the very "thin" user agent doesn't have to (like keeping track of

## The wireless application protocol (WAP) stack

<b>Application layer</b>	Wireless Application Environment (WAE)
<b>Session layer</b>	Wireless Session Protocol (WSP)
<b>Transaction layer</b>	Wireless Transaction Protocol (WTP)
<b>Security layer</b>	Wireless Transport Layer Security (WTLS)
<b>Transport layer</b>	Wireless Datagram Protocol (WDP)
<b>Network layer</b>	Wireless bearers (SMS, USSD, GPRS, CDMA, iDEN, GPRS)

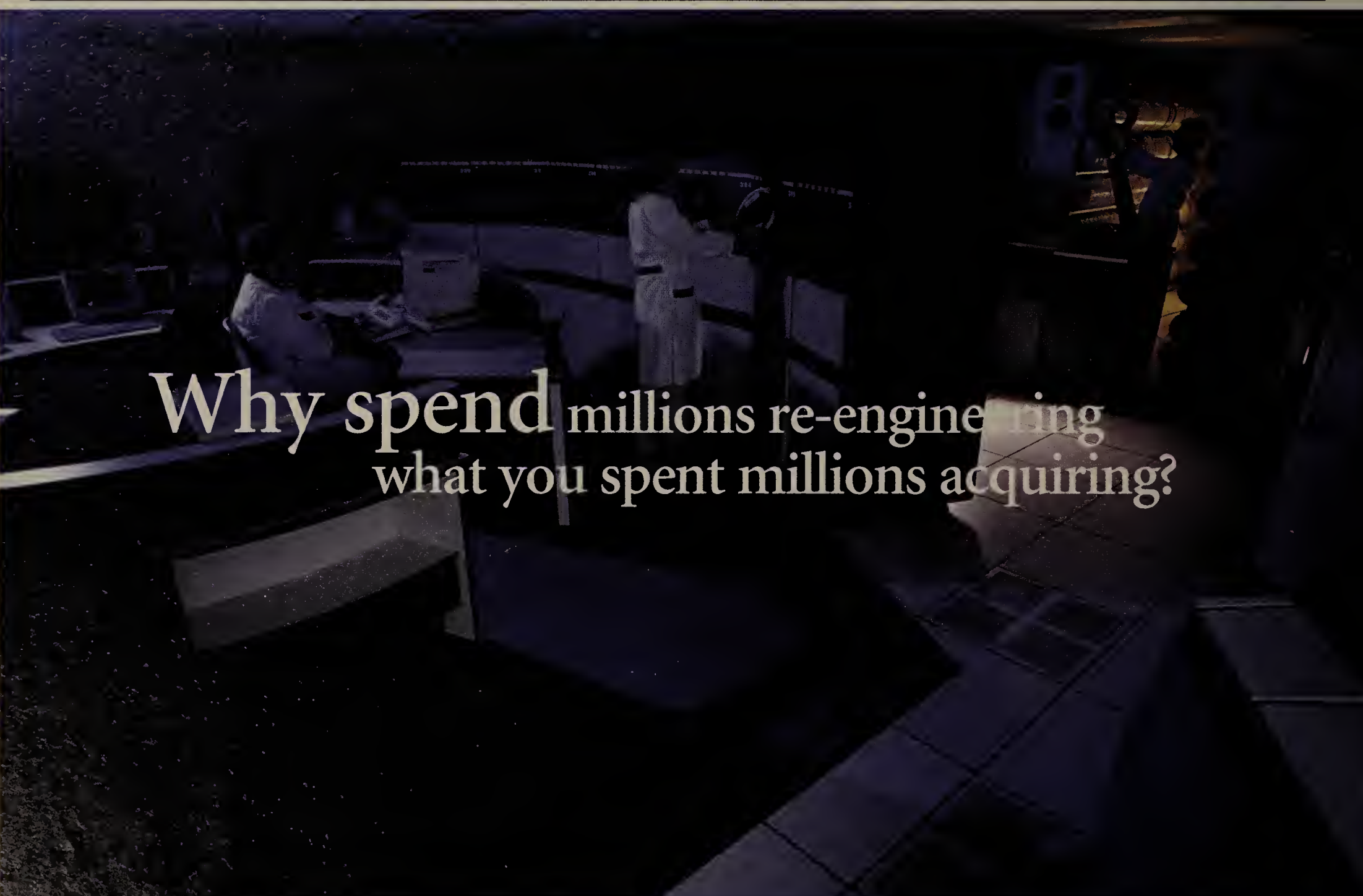
the WAP client's bookmarks, managing its cache, and so on), the WAP server handles the interface between the two sets of network protocols, wireless (WAP) and wireline (TCP/IP).

The WAP programming model is simply standard Web programming with a WAP gateway in the middle of the request/response cycle. A cell phone or other wireless terminal requests, in byte code, a given URL; the WAP gateway server decodes and decompresses this, then sends it on to the appropriate Web server as an ordinary HTTP request. The process is then repeated, in reverse, on the response side of the cycle.

## The WAP model

The WAP gateway itself can live either within a cellular carrier's wireless network — Sprint PCS and others have already implemented WAP gateways — or for security reasons, in an enterprise environment, within your corporate firewall. In theory, the HTTP server can respond with HTML-based content. However, the WAE layer of WAP specifies an alternative markup language designed for use with thin wireless clients.

If standard HTML is served in response to the HTTP request, it falls to the WAP gateway server, or to an additional layer of middleware



Why spend millions re-engineering  
what you spent millions acquiring?



(which can be integrated with the gateway or on a separate server), to implement some form of content translation before the request can be relayed back to the WAP client.

The problem with this approach is twofold: First, accommodating wireless clients means leaving it up to a rules-based translation server to decide what Web-based content to include and what to leave out, in order to reduce major Web sites down to cell phone (or even PDA) dimensions. Second, far too much legacy HTML on the Web is anything but well-formed — trying to translate it on the fly simply won't work.

For the foreseeable future, therefore, the most effective WAP sites will be custom-coded in WML for wireless access.

In theory, WAP can support the same kind of mobile-centric applications as Web clipping, with the advantage that you don't have to worry about getting your users to download and sync applications from their desktops. In addition, because the user interface lives on the server and not the client, it can be updated more easily.

Of course, if the devices you want to target are digital cell phones, the user

interface is going to be even more constrained than on a PDA. This will likely limit the practicality of certain applications — just imagine trying to enter a lot of customer account information on a cell phone's alphanumeric keypad.

In fact, if you want to use cell phones as mobile terminals for accessing corporate data, you should also consider providing your mobile workers with a Web-based interface where they or their managers can personalize the content that appears on their phones.

This can help make the most of small form factors by targeting the right information and applications to the right users in the right circumstances. Imagine being able to set up different profiles for salespeople, delivery people, field technicians and project managers — and then letting them each configure their own "views" of the wireless site depending on their client lists or routes.

## Looking ahead

Of course, Web clipping and WAP don't exhaust the possibilities of the wireless Web. There are wireless modems and HTML-rendering browsers available for Palm III and V that give

users the full Web experience, like WAP, without the need to go through a WAP gateway. Unfortunately, you will probably still have to custom-code your content (in a restricted subset of HTML), and you will lose the advantage of device and network interoperability. (Your new Cellular Digital Packet Data modems won't work on Code Division Multiple Access or GSM networks, for example.)

On the other hand, PDAs (and larger devices) can increasingly be teamed with WAP phones through the use of data cables and/or PC or Compact Flash cards. (Windows CE devices have been out in front in this area.) This gives you some of the advantages of WAP without being tied to the cell phone form factor and user interface. Going forward, expect to see more WAP-compatible cell phone/PDA hybrids, such as the Ericsson R380, which is not yet available in the U.S.

In such a rapidly evolving field as wireless, it is difficult to make predictions, but we can see a succession of new technologies just emerging or waiting in the wings:

- The WAP standard includes the specification for a server-centric scripting

language called WMLScript, support for which is gradually being implemented on the latest WAP-enabled cell phones.

- Voice-based user interfaces written in Voice Extensible Markup Language (VXML).

- Location-specific applications that take full advantage of the Global Positioning System.

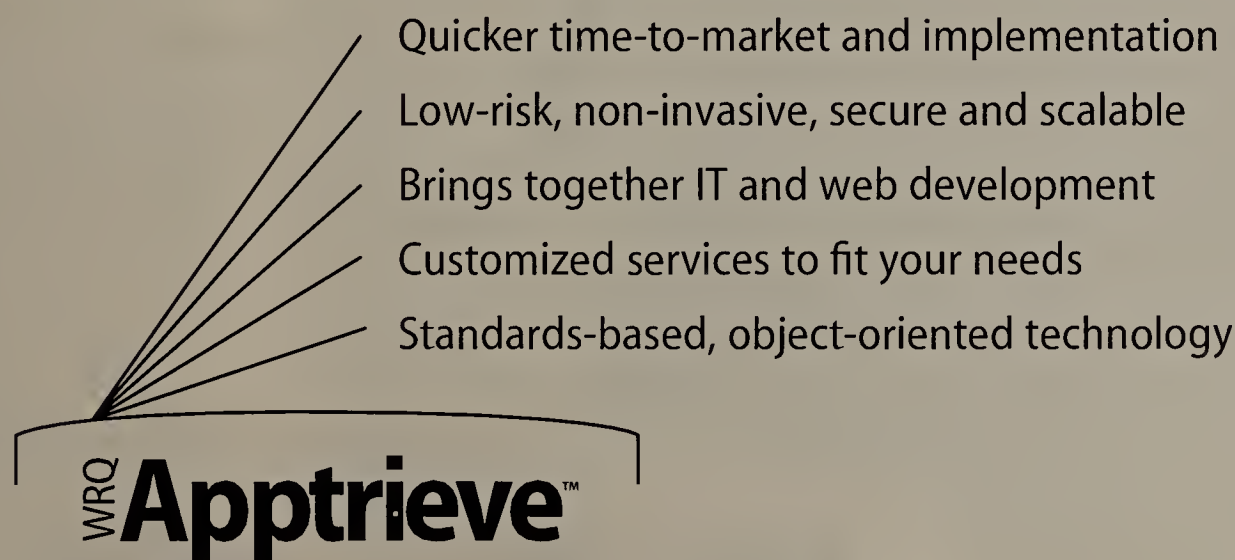
- Mobile videoconferencing.

With any luck, standards like WAP, and the new XHTML specification that lays the groundwork for a convergence of WML and HTML, should keep things relatively simple on the network side. In-house Web developers will have to learn some new development tools and APIs, but, if all goes well, nobody will be called upon to reinvent the back-end wheel.

*Powell is president of Pint, a Web development firm in San Diego, and founding member of Dokoni, Inc., a wireless Web application developer and services provider, also in San Diego. Lima is general technical manager at Dokoni. Powell can be reached at [tpowell@dokoni.com](mailto:tpowell@dokoni.com), and Lima can be reached at [jlina@dokoni.com](mailto:jlina@dokoni.com).*

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# THE COPPER ALTERNATIVE

**New switch interfaces allow you to connect devices at Gigabit Ethernet speeds using ordinary Cat 5 cable.**

BY DAVID AXNER

**N**etwork executives now have the option of using ordinary unshielded twisted-pair copper cabling for Gigabit Ethernet switch connections for short distances at half the cost of fiber.

The IEEE 802.3ab Task Force ratified the 1000Base-T copper interface standard last June, and some vendors have begun offering the necessary copper-based physical interfaces on their Gigabit Ethernet switches. The good news is that Category 5 cable is installed in most buildings in the U.S., which means there's no cable installation cost, except for the new connection itself.

There are two catches, however. First, the existing Cat 5 cabling you have in your LAN may be adequate for carrying Ethernet and Fast Ethernet, but it may not be up to snuff when it comes to Gigabit Ethernet. The cable connections in the wiring closet may not meet the new standard, the cables may be improperly installed or there may be other kinds of wiring problems that never came up when you were running electrical signals far below a gigabit.

If your cabling is up to spec, the other catch is that you can only use copper cable at gigabit speeds for runs of 100 meters (328 feet) or less.

There are, however, many types of installations that fall within that 100-meter limit, including horizontal runs between wiring closets on the same floor; vertical risers between floors, within wiring closets and data centers to interconnect multiple workgroup switches; and backbone switches, to connect servers and to connect high-performance workstations to switches. In that case, for example, Cat 5 cable would be connected to a 1000Base-T port on the switch and a 1000Base-T port on the workstation network interface card (NIC).

Fiber-optic cable is still required for horizontal or vertical building connections that exceed the 100-meter limit. Typically, this would be vertical backbone risers between a data center on one floor and wiring closets on other floors.

Unfortunately, deployment has been slowed by the lack of availability of these copper Gigabit Ethernet interfaces, which is due to semiconductor manufacturers not producing enough copper Gigabit Ethernet interface chips to meet the growing demand.

But switch and NIC vendors are beginning to announce copper interfaces on their existing gigabit products as add-ons and also on new products.

Alteon WebSystems has introduced a 10/100/1000Base-T NIC, which autonegotiates to the highest speed and supports Jumbo Frames for improved server performance. Its copper ACEnic costs \$500, about half the cost of fiber NICs.

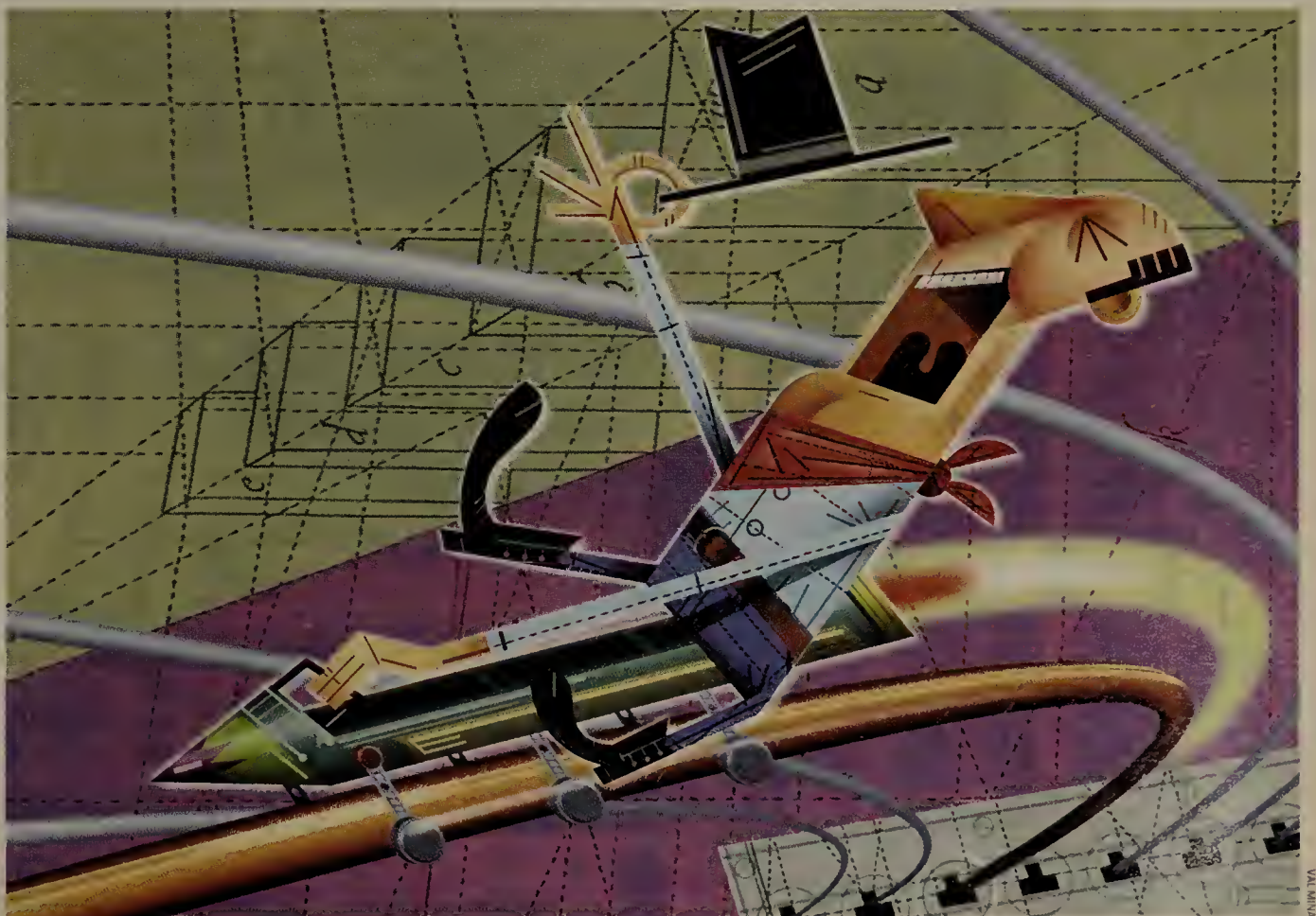
Extreme Networks has a copper-based Gigabit

Ethernet switch, the Summit7i Internet Data Center Switch. The Summit7i is available with 28 1000Base-T ports for Cat 5 at about \$700 per copper port. Extreme also has an announced an eight-port 1000Base-T module for its Black Diamond core backbone switch.

And Foundry Networks has a 1000Base-T interface module for existing Foundry switches. Foundry also introduced its FastIron II GC 1000Base-T workgroup switch, available with 16 or 24 1000Base-T ports, and its high-density FastIron II Plus GC switch with 64 1000Base-T ports. Foundry's system-level price for a 1000Base-T switch is \$650 per port, well below the price of its fiber ports.

## State of the WAN

On the WAN side, fiber cabling is necessary for the transmission of high-speed traffic over extended distances within a building or campus, and for long distances over thousands of kilometers to intercon-





nect WANs and metropolitan-area networks (MAN).

There are two basic types of fiber-optic cable: multimode and single-mode. Multimode is suitable for short-haul connections, while single-mode fiber cable is required for long-haul connections. The IEEE 802.3Z Gigabit

Ethernet standard specifies a maximum cable length of 550 meters (1,800 feet) for multimode fiber and a maximum cable length of five kilometers (three miles) for single-mode fiber.

For distances beyond three miles, there are transceivers that connect to

single-mode fiber cable and can support cable distances of more than 100 kilometers.

On the LAN side, GigaBit Interface Converters (GBIC) are becoming popular for connecting switch ports to fiber cables. A GBIC contains the interface optics for fiber cabling and

is essentially a transceiver that converts electrical interface signals to light signals and the converse. It plugs in to a 1000Base-X switch port and connects to a fiber cable. GBICs that provide 1000Base-SX, -LX and LH (long haul — 70 kilometers or more) optical interfaces are readily available.

GBICs benefit the switch vendor by providing the flexibility to populate the switch with any mix of interface types, eliminating the need to configure the switch with a fixed number of ports for each interface type. It also reduces the manufacturing cost of a switch. GBICs benefit users by giving them the flexibility to configure a switch according to their needs and to change the configuration to satisfy future applications, extending the life of the switch. GBICs also provide fault tolerance by enabling users to replace a faulty GBIC with an operable spare. GBIC prices currently average \$400 for an SX port, \$1,400 for an LX port and \$5,500 for a 70-kilometer LH port.

■ **The rising demand for copper interfaces will undoubtedly impact the LAN fiber market.**

The price of fiber-optic switch ports is steadily declining. 1000Base-SX ports initially priced as high as \$3,000 when the technology was new, are now available for as low as \$1,000 per port, while 1000Base-LX ports, initially priced as high as \$5,000, are now priced as low as \$3,000 per port.

The rising demand for copper interfaces will undoubtedly impact the LAN fiber market. Users will elect to go with copper wherever the application allows them to decrease equipment and installation costs. The cost of copper ports is roughly half the cost of short-haul fiber ports. Since the demand for copper will pressure vendors to drop the price of short-haul optical interfaces, copper will erode the price of optical interfaces as copper interfaces become abundantly available.

On the fiber side, a strong market exists for fiber applications that copper cannot address — vertical risers in buildings; campus backbones; network-to-network connections such as enterprise networks connected to MANs; service providers or carriers; and wide-area optical networks. WAN-

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and MAN-related applications are heating up, so that's potentially a very strong market for fiber cable. An increasing demand for long-haul fiber transceivers should drop prices as they become readily available from multiple sources.

Now that Ethernet is poised to take

another giant leap from one gigabit to 10 gigabits, the question arises of whether 10 Gigabit Ethernet will ever run over copper. The 802.3ab Task Force had to implement heroic digital signal processing techniques to get signals to run over copper cable at 1G bit/sec. With 10G bit/sec signal-

ing, the signaling rate is 10 times the gigabit signaling rate, which would require extraordinary engineering to develop the technology to run over copper cable.

It might be possible to develop a 10G bit/sec technology for copper cable using Cat 6 or 7 cabling, but it

is doubtful whether Cat 5 copper cable could carry 10G bit/sec signaling. According to the IEEE 802.3 experts, it should be possible to run 10G bit/sec over good Cat 6 cable up to 100 meters, and maybe some distance over Cat 5-enhanced cable. Some of these experts believe the best approach is to follow modem technology and create a multirate system with a line-quality rate setting process as part of the start-up routine that would negotiate the data rate up or down at gigabit increments between one and 10 gigabits. It is likely that some Cat 5 installations could support at least 2.5G bit/sec, which would improve performance over copper horizontal wiring.

Probable applications are linking switches, a high-capacity storage-area network technology and switch-to-server technology. It could also be used to increase the performance on horizontal copper links.

*Axner is president of DAX Associates, a networking consultancy in the Philadelphia area. He can be reached at [daxner@earthlink.net](mailto:daxner@earthlink.net).*



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## Spec splits gigabit signals

The goal of the 802.3ab Task Force was to develop an interface specification that would enable 1000M bit/sec of data to be sent over unshielded twisted-pair copper cable. To achieve this goal, the transmission frequency must be reduced to a level that could be sent over a Category 5 cable with a very low error rate, specified as one bit error in 10 billion bits.

The 1000Base-T specification accomplishes this by splitting the aggregate signal into four paths and using a modulation scheme to halve the frequency over each path. The modulation scheme, called 5-level pulse amplitude modulation (PAM), encodes two information bits per signal pulse, which cuts the signaling rate in half. Each wire pair then handles 250M bit/sec at 125 MHz for an aggregate 1000M bit/sec over four pairs. The two-pair 100Base-T interface for Fast Ethernet confirmed that Cat 5 cabling could support frequencies up to 125 MHz. The 1000Base-T interface is a full-duplex interface, which effectively doubles the transmission rate. The 1000Base-T specification limits cable length to 100 meters (328 feet) for its specified performance.

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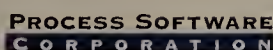
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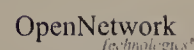


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Last summer we advised you to keep your excitement in check about Gigabit Ethernet vanquishing your LAN bandwidth problems (NW, July 5, 1999, page 35.) Tests conducted by West Virginia University showed that while Gigabit Ethernet could enhance overall network performance, we uncovered some significant limitations that came into play when Gigabit Ethernet is connected directly to servers and workstations.

Well, nine months later there's good news. Second-generation Gigabit Ethernet products certainly do promise enhanced performance all the way to the desktop.

Server CPUs now clock speeds up to 550 MHz as the norm, and new 64-bit/66-MHz bus architectures relieve the bus I/O bottleneck. Second-generation Gigabit Ethernet network interface cards (NIC) have onboard intelligence that allows them to off-load functions such as checksum calculations from the CPU and operating system for a marked performance increase. And finally, Microsoft claims to have made significant strides in improving operating system network support in Windows 2000.

What do all these second-generation improvements buy us? To find out, West Virginia University's Advanced Network Applications Lab repeated our Gigabit Ethernet performance tests against these new and improved conditions.

We restricted our testing to Win 2000 because to date it is the only operating system available to us that includes improvements specifically geared toward enhancing Gigabit Ethernet performance.

In our previous round of testing, the best Gigabit Ethernet performance we saw was 29M bit/sec measured in a file transfer between a Windows NT 4.0 server and a Windows 95 client. This amounted to a meager 3% bandwidth utilization

# Gigabit Ethernet hits second gear

**Faster chips, wider buses and Windows 2000 contributes to increased throughput, but hard drives remain the bottleneck to getting Gigabit Ethernet to the desktop.**

BY JEFFREY N. FRITZ

tion over Gigabit Ethernet.

Using second-generation Gigabit Ethernet products and Win 2000, the best real-world throughput was 158M bit/sec (see graphic, below), which sets bandwidth utilization at 16%. On average, we measured performance ranging from 137M to 145M bit/sec. These results bode well for connecting server and high-performance workstations directly to Gigabit Ethernet — something we couldn't recommend previously.

This prompts us to ask two questions: First, what accounted for the performance improvement? Second, why didn't we see even better performance and higher bandwidth utilization?

Our network topology did not change between rounds of testing. We used the same fiber-connected

Allied Telesyn 9108 Gigabit Ethernet switch that we did last time. Each PC had a SysKconnect Gigabit Ethernet NIC directly connected to the switch.

What did change between test runs was that we used Dell Precision 610 workstations with 500-MHz Xeon Pentium III CPUs. These are much faster than the Dell Optiplex 200-MHz Pentium II PCs used in our last test. We installed a SysKconnect SK-9844 SK-NET GE-SX dual-link second-generation Gigabit Ethernet NIC in each PC. And finally, we used production versions of Windows 2000 Professional on the client machines and Windows 2000 Server on the servers.

The most significant improvement came from using PCs with more processing power. We proved this by installing NT 4.0 Service Pack 5 and

the SysKconnect NICs on the Optiplex 200-MHz PCs. In our previous Gigabit Ethernet testing, it was typical to see throughput rates between 21M to 29M bit/sec. We reran these tests and achieved results consistently around 23M bit/sec.

We then installed Win 2000 Professional and Server on the Optiplex machines. With the new operating system installed, the average throughput inched up to the 28M to 31M bit/sec range.

In our first round of tests with the Dell Optiplex 200-MHz PCs, the average performance for Fast Ethernet running NT 4.0 was about 19M bit/sec. Switching to Gigabit Ethernet in that instance increased performance to about 23M bit/sec. With Win 2000 on these same machines, we measured an average throughput of 29M bit/sec over Fast Ethernet. Switching to Gigabit Ethernet, the average throughput did not change — it was virtually the same as Fast Ethernet!

Obviously, the slower machines were bumping up against internal PC constraints due to hard drive, bus and processor speed limitations. These PCs simply couldn't process packets as fast as the network could deliver them, even with Fast Ethernet.

If you are running older servers or workstations, don't waste your money plugging Gigabit Ethernet directly into them. Our test results indicate that unless you have modern PCs running as servers or workstations, you can forget about gaining any significant network performance advantages with Gigabit Ethernet to the desktop.

We then installed NT 4.0 Service Pack 5 on the new Dell Precision 610 PCs with the SysKconnect Gigabit Ethernet NICs and reran our performance tests. Under these conditions, we reached throughputs in the 100M to 107M bit/sec range. This was a significant improvement over our

## Gigabit Ethernet picks up speed to the desktop

Tests show that faster PCs and operating systems tailored to support Gigabit Ethernet speeds make a difference on the LAN.

Test	From	To	Connection speed	File size	Transfer time	Rate	Network utilization
Gigabit Ethernet test with Windows 2000 on 500 MHz Dell PCs	Windows 2000 Server	Windows 2000 Professional Desktop	Gigabit Ethernet	378,741,855 bytes	19.1 seconds	158.6M bit/sec	16%
Gigabit Ethernet test with Windows 2000 on 200 MHz Dell PCs	Windows 2000 Server	Windows 2000 Professional Desktop	Gigabit Ethernet	378,741,855 bytes	96.33 seconds	31.5M bit/sec	3%
Gigabit Ethernet test with Windows NT 4.0 on 200 MHz Dell PCs	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Gigabit Ethernet	378,741,855 bytes	128.97 seconds	23.5M bit/sec	2%
Fast Ethernet test with Windows 2000 on 200 MHz Dell PCs	Windows 2000 Server	Windows 2000 Professional Desktop	Fast Ethernet	378,741,855 bytes	102.09 seconds	29.7M bit/sec	3%
Fast Ethernet test with Windows NT 4.0 on 200 MHz Dell PCs	Windows NT 4.0 Workstation	Windows NT 4.0 Workstation	Fast Ethernet	378,741,855 bytes	158.66 seconds	19.1M bit/sec	2%

Note: These scores are an average of multiple test runs in each category. Full results on [www.nwfusion.com](http://www.nwfusion.com).



previous testing. However, the utilization on a 1,000M bit/sec network was still low at about 10%.

The good news is that with newer PCs and second-generation NICs we can now overrun Fast Ethernet with a single client/server stream. This justifies Gigabit Ethernet to the desktop, particularly for server connections, and also for high-performance workstation needs such as multimedia and CAD/CAM.

Next, we tested what changes Win 2000 would make on the more powerful workstations. We were now seeing throughputs ranging from 138M to 145M bit/sec. That's impressive performance and a definite improvement over NT on the same PCs, but we were still troubled by the poor network utilization. Even at 145M bit/sec, we were only using less than 15% of the available Gigabit Ethernet bandwidth.

#### Where's the beef?

One thing is certain when it comes to bottlenecks — they tend to move around. For a long time, the network was the bottleneck. However, with newer network topologies such as ATM and Gigabit Ethernet, that doesn't have to be the case anymore. Today's network performance bottlenecks can be found in the NIC, the computer bus and even in the components within a server or workstation, such as the CPU.

To find out what internal components were slowing down Gigabit Ethernet utilization in our tests, we used direct memory transfers. While these transfers don't reflect a real-world situation, they did help us pinpoint the bottleneck. Memory testing removes the hard drives completely from the picture while leaving everything else (CPU, bus, NIC, etc.) in place. We felt it was likely that the hard drive, more than any other PC component, was restricting our overall throughput.

Our suspicions were correct. Using memory-to-memory tests, our throughput increased to 360M bit/sec. This was nearly a 250% increase achieved by bypassing the hard drive. Mind you, these PCs did not come with inexpensive ISA hard drives:

## JUMBO FRAMES

In our last test we did not use Jumbo Frames because they were typically not used in Gigabit Ethernet networks at the time. However, Jumbo Frames have become a hot topic among Gigabit Ethernet users. Since Gigabit Ethernet bandwidth is so much higher than Fast Ethernet, a larger frame size is more efficient because it lowers the overhead.

The standard Ethernet frame is 1,615 bytes per frame. When we increased this to 9,014 bytes per frame, our throughput jumped to 806M bit/sec with memory transfers. At nearly 81% utilization, we were finally seeing

decent Gigabit Ethernet bandwidth utilization. However, not all Gigabit Ethernet vendors support Jumbo Frames yet. For example, neither of our switches supported Jumbo Frames.

Bringing the hard drive back into the picture destroyed any performance gains we achieved with Jumbo Frames. Using file transfers, even with Jumbo Frames, our throughput dropped back to about 137M bit/sec — virtually the same throughput we measured without Jumbo Frames. This is yet another indication that the hard drive has become a major bottleneck to network performance.

### Jumbo Frames: The bigger, the better for Gigabit Ethernet network utilization?

Increasing the standard Ethernet frame from 1,615 bytes to 9,014 bytes per frame can help increase network utilization to the desktop.

Sending machine	Receiving machine	Test type	CPU utilization		Transfer rate (M bit/sec)	Network utilization
			Sender	Receiver		
Windows 2000 Server	Workstation 2 with Windows 2000 Professional	File transfer	28%	40%	138.1	14%
Windows 2000 Server	Workstation 2 with Windows 2000 Professional	Memory to memory test	58.5%	99.6%	806.1	81%

They used Quantum 9G-byte Ultra2/Wide SCSI (10,000 rpm) hard drives. Even then, the drives simply could not keep up with the write requests coming from the network.

This test indicates that a significant part of the transfer limitations over Gigabit Ethernet is due to the time it takes today's hard drives to read and write information. While users can improve hard drive performance by adding additional or faster disks, drive vendors can also contribute to network performance by designing hard drives that contain larger on-disk cache that are optimized for random I/O.

In our 1999 review, we were critical of the way Windows machines handled network processing. Every packet had to be handled by the operating system, meaning that the CPU, bus and memory of the PC had to be involved in packet processing. This resulted in hampered network performance.

Win 2000 is Microsoft's first attempt to move packet processing where it

belongs — back to the NIC. In addition, there have been some major changes made in how Win 2000 handles the IP stack that resulted in enhanced performance.

In our previous installment, we deliberately did not tune IP parameters for our testing. The idea was not to tweak or optimize the way the operating system handled packets, but instead use the default IP parameters. We took the same approach in testing second-generation Gigabit Ethernet. However, this time there were a few differences.

For one thing, Win 2000's TCP/IP implementation is largely self-tuning. For example, Win 2000 implements the Network Driver Interface Specification (NDIS) 5.0 standard. NDIS 5.0 brings a number of features to the table, such as off-loading tasks to the NIC by allowing it to perform TCP hardware checksum and IP Security. By default, NDIS 5.0 allows TCP/IP to query the NIC driver to find out what Maximum Transmission Unit (MTU) is supported. This helps

the operating system use the largest possible MTU and that, in turn, increases network efficiency. There is also some manual tuning you can do, such as large packet segmentation and the use of Jumbo Frames, that can improve in a Gigabit Ethernet environment (see story, above).

We used our memory tests to measure the difference between hardware and software checksum. TCP uses a checksum on the headers and data of each segment. This reduces the chance that network corruption will result in a damaged packet making its way into the network application. Performing checksums is a mathematically intensive process that in previous Windows versions was handled by the CPU and operating system. Since checksum has to be performed for every individual packet, this can take a heavy toll not only on network performance, but also on CPU usage.

Win 2000 changes this by allowing the NIC to perform TCP checksum calculations (see graphic, below). Obviously, the NIC driver must provide support for this function, but if it does, the performance increase can be significant. In our tests, off-loading the checksum calculations to hardware made throughput jump to 504M bit/sec. This represents over a 50% improvement in network utilization.

Our testing clearly shows that Gigabit Ethernet network performance increases dramatically by using second-generation NICs, operating systems designed for high-per-

### Proving that Gigabit Ethernet is gaining ground

Our memory-to-memory tests demonstrate that if you remove the PC disk drive bottleneck, the network achieves speeds closer to capacity. Likewise, Windows 2000 pushes checksum calculations onto the NIC to boost network performance.

From	To	Test type	CPU utilization		Rate (M bit/sec)	Network utilization
			Sender	Receiver		
Windows 2000 Server	Windows 2000 Professional Desktop	Memory to memory test	81.3%	79%	360.6	36%
Windows 2000 Professional Desktop	Windows 2000 Server	Hardware checksum	79.4%	96%	504.8	50%











## HOW WE DID IT

From a network point of view, not much changed from our last Gigabit Ethernet test. We used the same Allied Telesyn 9108 Gigabit Switch. We added a Cisco 4912G Gigabit Ethernet switch to the network because it allowed us to swap Gigabit Ethernet switches to ensure that the network switch did not provide any performance issues. Both switches performed equally well.

We replaced the older Dell Optiplex 200-MHz PCs with Dell Precision 610 workstations. Each Precision 610 had a Quantum 9G-byte Ultra2/Wide SCSI (10,000 rpm) hard drive, a 500-MHz Pentium Xeon III processor and 128M bytes of memory.

We installed Windows 2000 Professional on two of the Dell Precision 610s and used them as clients. We installed Windows 2000 Server on the third Precision 610.

We first performed real-world testing by transferring a noncompressible 378,741,855-byte file between the various machines. We performed server-to-client transfer and client-to-client transfers.

Each time we conducted a transfer we renamed the source file so Win 2000 would not have the ability to cache the file in memory. We then measured the transfer time on several runs to and from each of the machines and averaged the results. For the file transfer test there was no attempt to tune Win 2000.

We then tested the maximum performance we could get out of Win 2000 over Gigabit Ethernet by conducting memory-to-memory testing while tuning Win 2000. The tuning we applied in our testing came from the Microsoft's "Windows 2000 Performance Tuning Guide."

The tool we used for our memory tests was the Windows NT version of Test TCP or TTCP (called NTTTCP). TTCP is a benchmark that has been used by the network industry to isolate the TCP/IP stack and network drivers. The NT version utilizes some of the advanced asynchronous I/O features of Win 2000.

formance networks and faster, more powerful PCs. With this combination in hand and some sensible TCP tuning, you can get closer to the kind of network performance Gigabit Ethernet promises.

*Fritz serves as the principal network engineer for West Virginia University's Network Services department. He can be reached at [jfritz@wvu.edu](mailto:jfritz@wvu.edu).*

*The author would like to thank the*

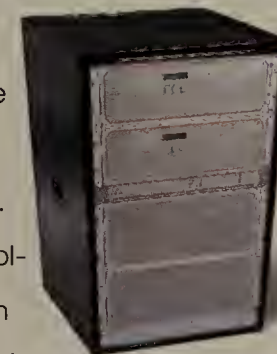
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# Management Strategies

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## Point and click FOR HELP



**Third-party technical support Web sites offer an alternative to relying on your hardware and software vendors.**

BY TONY KONTZER

**A**mid all the wonders of the Internet age, perhaps the greatest payoff to network professionals has been this: Endless waits for bungling telephone support staff are giving way to the growth of online support.

While vendors have offered online technical support for several years, a growing roster of independent sites such as Experts Exchange, LinuxCare, NoWonder and PC Support provide a timely, cost-effective and more wide-ranging source of technical information.

IT staffers are bullish on this new resource, and it's easy to understand why. The sites offer expert advice, and users often get answers within hours. Best of all, the sites are free in many cases. At least they have been while the support firms have been racing to increase their base of registered users.

In the eight months since its launch, NoWonder has built a marketplace with 500,000 subscribers. CEO Anthony Lye says the site is intended to be an environment where sellers fight over buyers. As of now, no money changes hands. But in the next few months, technicians will begin posting competitive bids to answer users' questions, with NoWonder taking a commission on each transaction.

Meanwhile, Experts Exchange has registered 300,000 members and 45,000 experts since its 1996 launch. Experts Exchange gets more directly involved in transactions than NoWonder by employing a point system.

Experts accumulate points for answering questions — the average value is about 200 points per question — and the more difficult the question, the more points the user has to offer to get an answer.

Experts then can redeem their points in exchange for support. Users who don't wish to provide support can purchase points directly from Experts Exchange.

Regardless of the model, online support has become the IT pro's best friend.

NoWonder has helped Jen Carroll cover a lot of technical ground in the first year and a half of her career. As a junior network administrator for eSmart-Buildings.com, a colocation facilities and network consulting firm in Salt Lake City, Carroll helps maintain networks running everything from Windows NT and Solaris to Oracle and Linux.

Carroll has sought online help for snafus ranging from software errors to network protocol problems. "NoWonder has provided fresh approaches to troubleshooting issues — ones that I was too frustrated to see," says Carroll.

However, Carroll says she only turns to the site

when she's in a hurry and has no immediate access to a resource — such as a book or colleague — that could answer her question.

Darcy Morse, a network administrator for the Richland School District in Richland Center, Wis., has been a devotee of Experts Exchange since her first visit last April. Morse says Experts Exchange offers her a quick and inexpensive alternative to telephone or on-site support. She also has found the site's database of previously answered questions to be a great research tool.

Most recently, Morse turned to the site for help with a network route-mapping problem. She first approached her contracted support provider, whom she pays \$100 per hour for a predetermined number of hours per year. When she didn't get a quick answer, Morse chose to go online. In just 90 minutes, she received the input she needed to solve the problem.

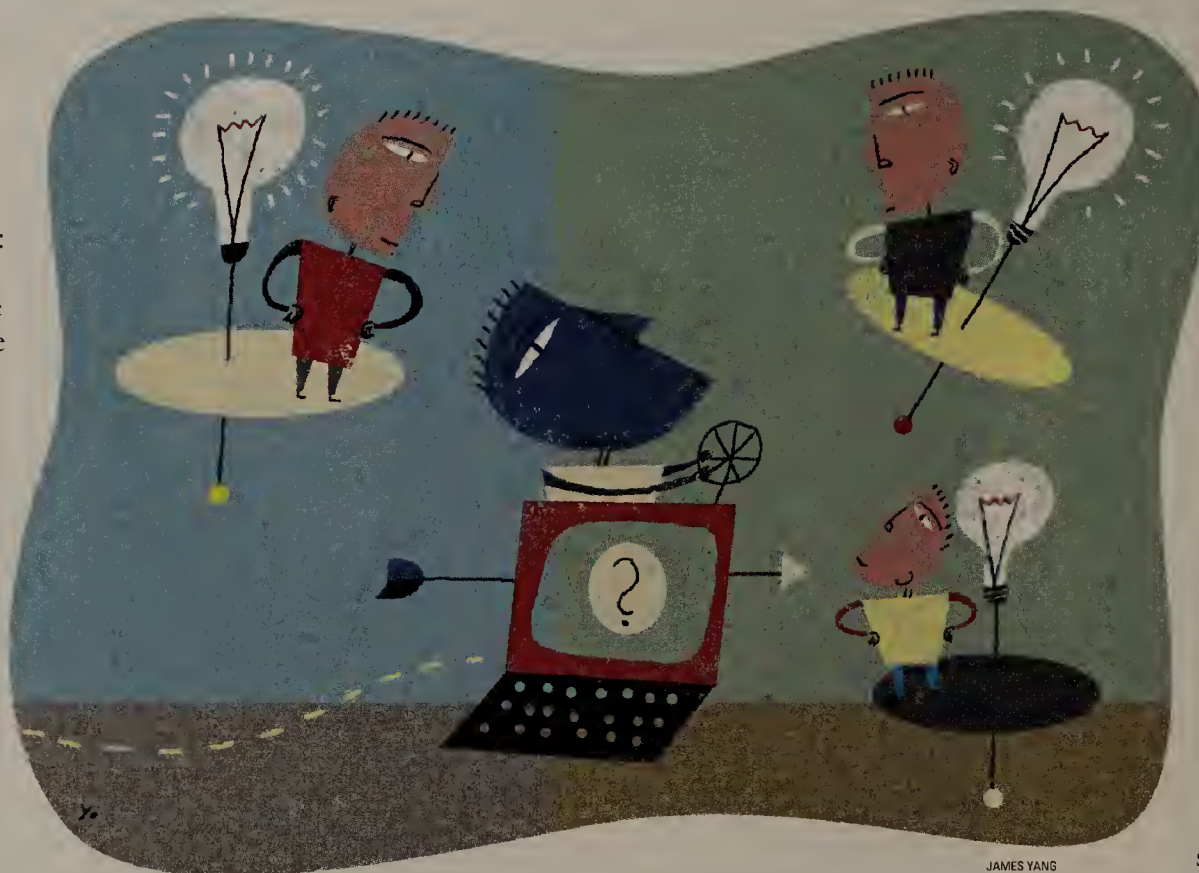
Chris Rondeau, an Experts Exchange user who also has become one of the site's most productive experts, says he rarely sees questions that can't be answered within a few days.

Rondeau, a senior systems administrator with the Atlanta office of engineering firm URS Corp., visited Experts Exchange last summer for help debugging a file that he couldn't access, and he's continued to ask questions every few months.

In the meantime, however, he's answered some 200 questions and become one of the top points-earners on the site. As a result, he gets free answers to Microsoft-related questions that would cost him \$195 an hour through a vendor.

Rondeau's advice to IT pros is to depend on online support sites for solutions to problems that aren't mission-critical. But that doesn't mean they won't come in handy in an emergency situation. "You never know," he says. "You can get lucky."

*Kontzer is a freelance writer in San Jose. He can be reached at [tony@goodink.com](mailto:tony@goodink.com).*



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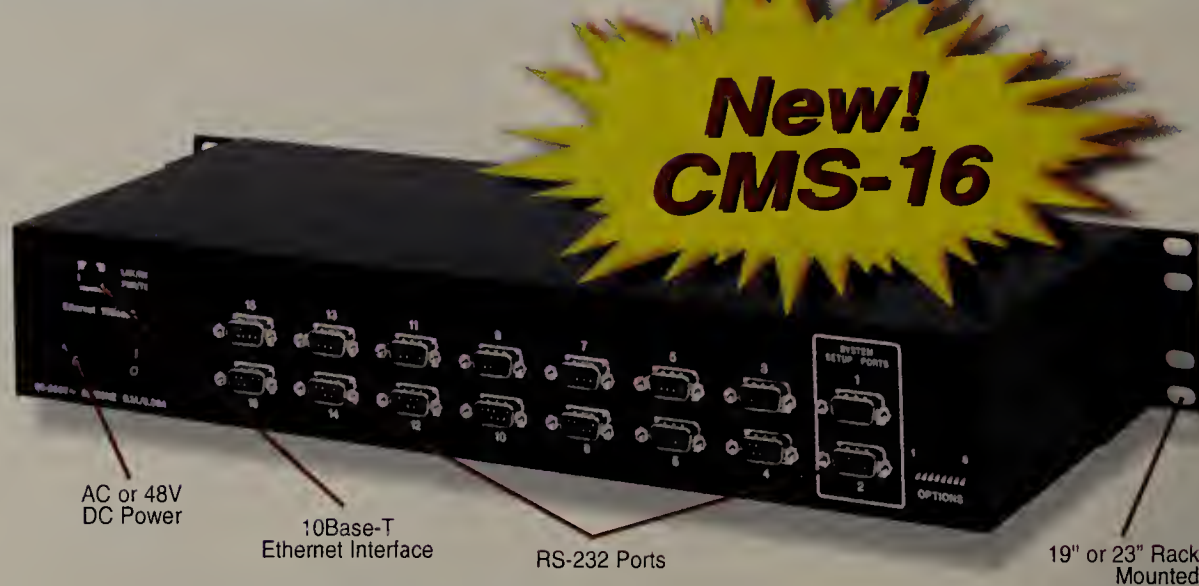
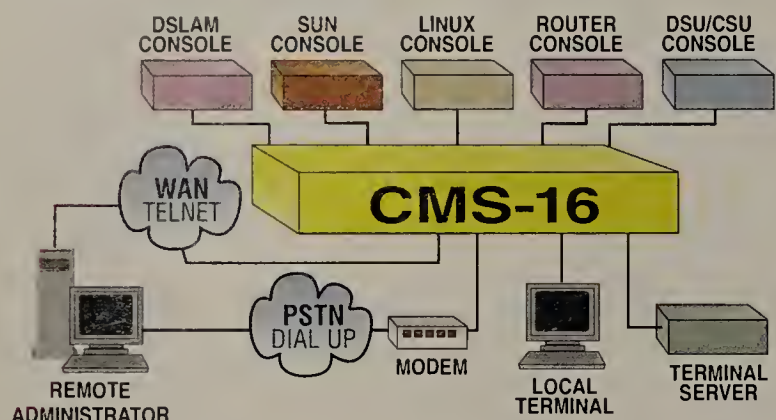
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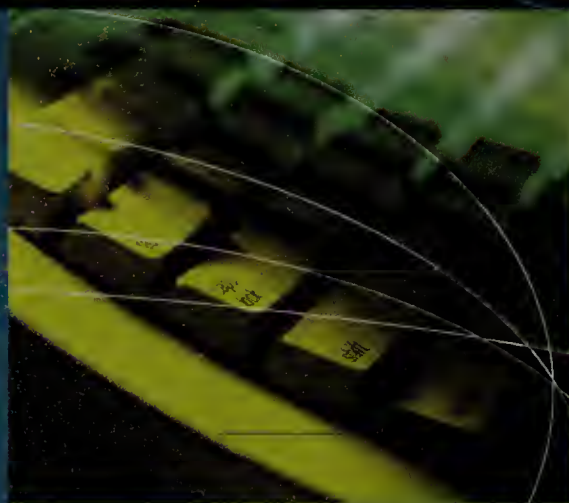
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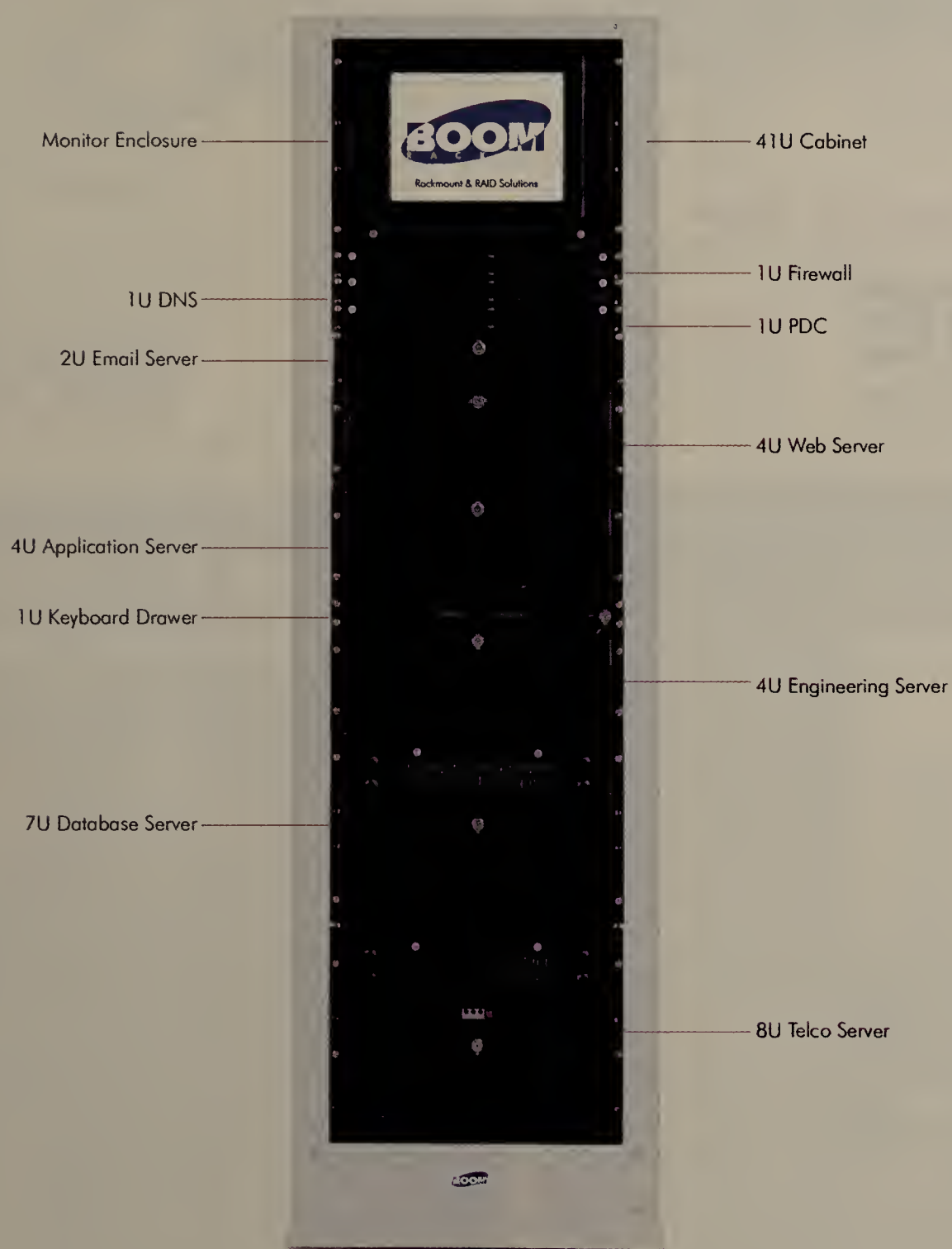








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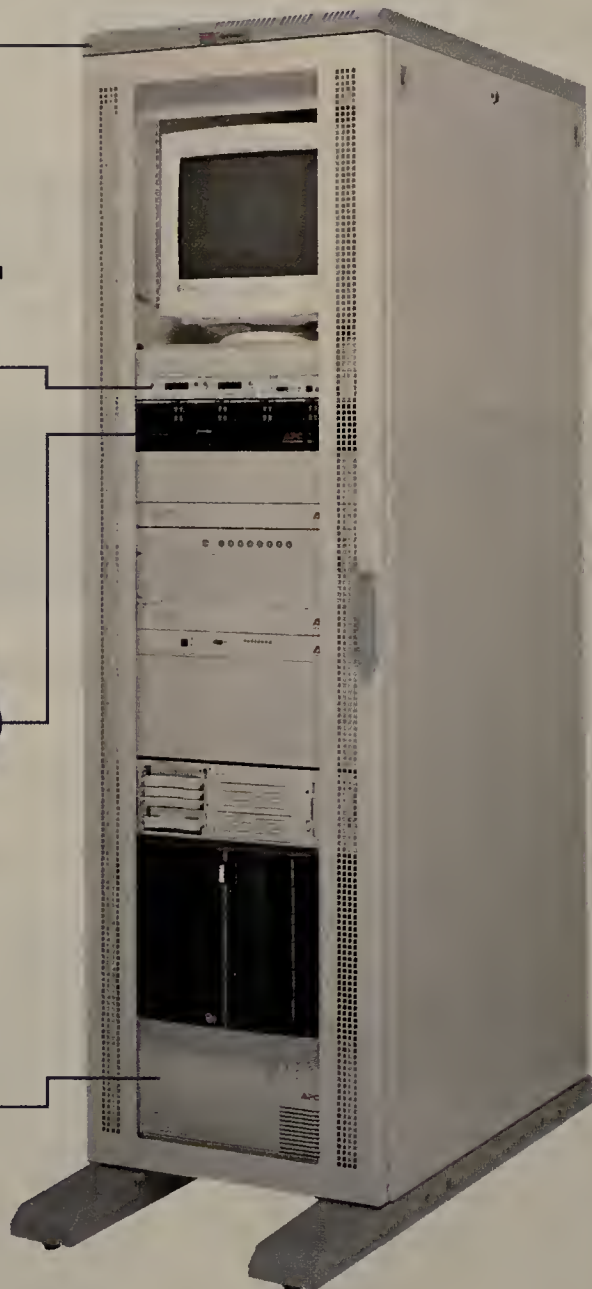
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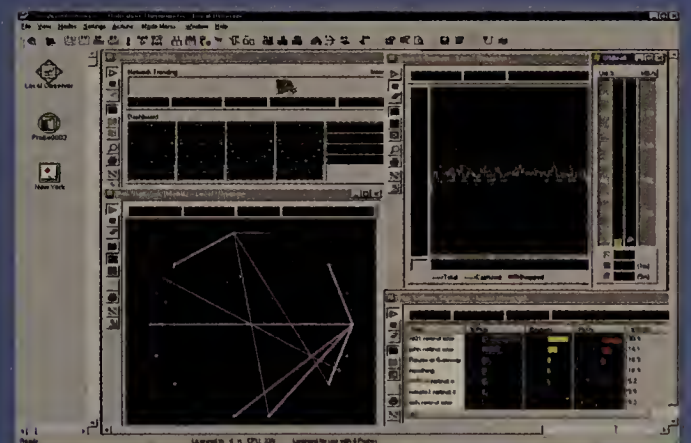
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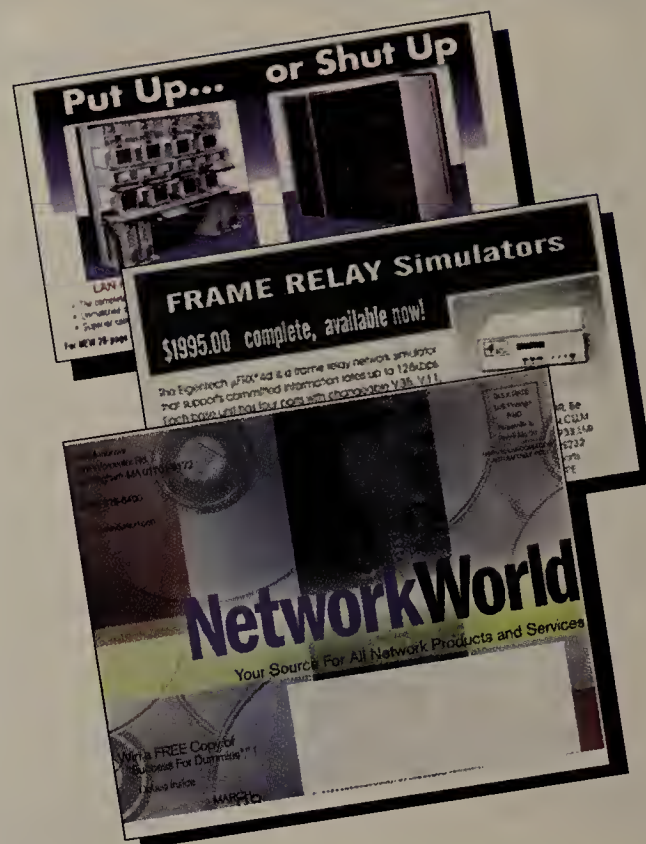
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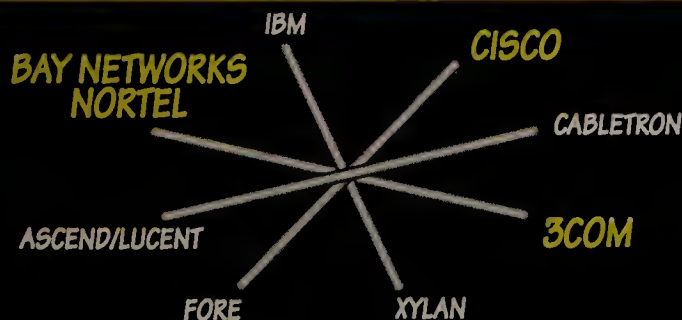
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Full-time Senior Software Engineer. Responsibilities include: Design, develop and implement leading edge Internet based transaction processing products utilizing state of the art web technology, transaction processing middleware and distributed databases; utilize UML, WFC, JAVA, ActiveX, DHTML, XML, JavaScript, Active Server Pages, HTTP, SSL, COM, C++, Oracle, SQL, Rational Rose Booch, Visual J++, JDBC, RMI, Domino WebServer, Lotus Notes 4.5, Windows NT and 98 and Unix to lay the foundation and structure the design for tier products; integrate technologies and test products for symmetry; manage junior software engineers and other support staff; and serve as technical liaison with in-house and client Project Managers. Must have a Master's Degree or its foreign equivalent in Computer Science or related field and one year of progressive experience as a Software Engineer or Systems Analyst, or a Bachelor's Degree or its foreign equivalent in Computer Science or related field and three years of progressive experience as a Software Engineer or Systems Analyst. Must have proof of legal authority to work in the United States. Salary: \$66,789 and up, commensurate with experience. If interested, submit resume in duplicate to:

Mr. Michael Hyman  
Fundtech Corporation  
157 Technology Parkway, Suite 100  
Norcross, Georgia 30092

Business Application Developer – Work with application development leader and other application developers and company's other business units to identify requirements, analyze, design, and develop business application solutions. Duties include analysis of business applications processes, evaluating competitor products, writing specifications for new application modules, developing database schema and entity diagrams, creating GUI and workflow, performing first level quality assurance, providing technical information to documentation department. Supervisory responsibilities as needed. Requirements include a Bachelor of Science Degree in Business, Computer Science or related field with at least one year of experience in job offered or related field of software analysis and design. Strong background in Windows environment. Applicants must have unrestricted authorization to work in the United States. Salary \$76,400 year. 40 hours/wk. Respond with two copies of resume to Case #19983213, P.O. Box 8968, Boston, MA 02114.

Special Event company is seeking a Software Eng. to be responsible for complete software dev. life cycle. Design & dev. Expense Report system with feature like heterogeneous users for reports generation, remote access via dial-up network, client server multiple user control, working with Visual Basic, C, MS Access, Object Oriented Analysis & Design; design & dev systems such as a food costing system for event coordinators to support subroutines in C; dev. application for assigning network ports for company employees; generate queries to extract statistical info. from company databases; perform system analysis & design, working with Oracle.

Qualified candidate must have B.S. or equiv. in Computer Sc. or Computer Eng. & two years relevant exp. OR, M.S. & 1 yr. relevant exp. Must be skilled in using C, Visual Basic, MS Access, Object Oriented Analysis & Design & Oracle. Salary of 60K per year. Sent resume to HR Director, The Fun Co., Inc., 3658 Atlanta Industrial Dr., Ste D, Atlanta, GA 30331

SYSTEMS ANALYSTS -Boehringer Ingelheim Pharmaceuticals, Inc. has 2 positions open at its Ridgefield, CT site. One position will include UNIX and OPENVMS System Support for supporting and enhancing all HP/UX, AIX and VMS systems. Must have bachelor's degree in Computer Science or related field and systems administration experience including supporting a UNIX and VMS environment. Second position will include supporting and enhancing Intranet communications server and environment and supporting and troubleshooting network operations while supporting Data Communications Engineers in Network-wide area Operations and Management. Must have bachelor's degree in Computer Science or related field and network experience focused on supporting a CISCO based routed and switched environment. Applicants send resume to BI Staffing Center. P.O. Box 534, Waltham, MA 02454-0534 or e-mail us at BIPI@BI-Careers.com All resumes must include Job Code AD-GCD/BIIT

Software Engineer needed in the Burlington, Vermont area to perform installation, on-site testing, and development of radiology and imaging software development releases. Will design, develop and implement network interfaces to third-party modalities and PACS. Will develop code in any number of programming languages and software tool environments. B.S. degree in computer engineering, science or related degree required. Successful candidate must have at least two years experience utilizing UNIX Platform and a variety of programming languages, including C and C++ languages. In addition, must have five years experience in visual basic product development and programming and applications deployment in a client service environment. Salary- \$65,000 per year. Applicants must send resumes to:

Attn: Job Order No. 628721  
Jobs and Training Division  
VT. Department of Employment and Training  
P.O. Box 488  
Montpelier, VT 05601-0488

## Software Engineer

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You will maintain and support field of current design, making improvements & modifications to release, as well as design new analytical models for predicting customer behavior. Assist system test team in building data that has statistical characteristics & deviations expected of telecommunications customers for performing analytical modeling & generating desired data distributions. Contribute to definition of new applications for Acquisition model & discuss customer issues for designing solution.

M.S. or Ph.D. in statistics or related field; 1 yr. exp. as Software Eng. or in analytic data modeling; knowledge of analytical data modeling projects operated in UNIX & NT environments; & proficiency with SAS, Clementine & related data mining & statistical packages required.

To apply, send resume to:  
Attn: **HRSE, NCR Corporation, 485D Route 1 South, Suite 400, Iselin, NJ 08830**, or e-mail to: **resumes@woodbridgenj.ncr.com**. **EOE.**



www.ncr.com

SOFTWARE ENGINEER: Proven ability in TSO, MVS/ESA, VM/ESA Operating Systems, COBOL, VS-COBOL II programming languages. Demonstrated ability in Analysis, Design, Code and Test Application Programs in DB2/CICS. Knowledge in using Debugging tools like Expeditor, Project Management Tools like Librarian/ROSCOE, Database Management Environments like QMF/DBEDIT/SPUFI. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct/systems programs as necessary. Requires Bachelors in Computer Science with 2 yrs of Software Development experience. 40 hours per week at \$70,000 per year. Please send resume to Case # 19990197, PO Box #8968, Boston, MA 02114.

Senior Programmer/Analyst (Columbia, MD & other MD client sites). Analyze, design, develop, code, test, implement, & maintain program application systems. Environment: IBM Mainframe; DB2; CICS; COBOL II; VSAM; JCL. Master's in Comp. Sci. or Comp. Applications + 2 yrs exp in job off'd or Bachelor's degree + 5 yrs exp; 40 hrs/wk; 8-5; \$70K/yr. Send resume to JO# 9684855; Dept. of Labor, Licensing & Regulation; 1100 North Eutaw St., Rm. 201; Baltimore, MD 21201.

SOFTWARE ENGINEER: Proven ability in coding COBOL II programs, JCL (Job Control Language) and CICS (Customer Information Control System) or Mainframe Systems. Proven ability in using DB2, the relational database model and IMS, the hierarchical database model used on the Mainframe System. Demonstrated ability in using the Mainframe related tools like the XPEDITOR (a COBOL debugging tool,) CHANGEMAN Software Configuration Management and database manipulating tools like OMF (Query Management Facility) and SPUFI (SQL Processing Using File Input). Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct/systems programs as necessary. Requires Masters in Computers with no experience required. 40 hours per week at \$ 70,000 per year. Please send resume to Case # 19990405, PO Box # 8968, Boston, MA 02114.

Software Engineer: Uses various software engineering techniques including Object-Oriented Design and Analysis to develop and design various healthcare software systems which will be implemented in an Internet site to allow compilation and distribution of an existing online database of clinical diagnosis data from various medical institutions. Develops appropriate systems architecture for purposes of creating various softwares, including related architecture design and integration, which will be used to access current diagnostic images and information for analysis of patients' conditions. Uses UNIX, NT, JAVA, C++, and other related Internet programming techniques in performance of duties. Requires Master's degree in Computer Science or Software Engineering.

Please send resume to:  
Z. Q. Chen, Vice President,  
Medical OnLine, Inc.,  
99 Hayden Avenue, Lexington,  
Massachusetts 02421.

Information Technology Management Consultants seeks to fill position of Sr. Consultant. Qualified applicant should have one of the following: B.S. or equivalent in a Computer Sc. or Engineering discipline; Math; or other Science discipline with additional computer related courses. Should have 3 yrs. relevant SAP R3 exp. Will provide services to clients in SAP R3 software development; design database for logistical modules; design, implement & administer client-server SAP solutions; integrate existing info. systems with SAP R3 parameters & provide basic info. to clients using SAP software & Lotus Notes; coordinate software projects & provide technical support in development of software products. Send resume to Managing Director, Magnus Management Consultants USA, Inc., 3340 Peachtree Rd., NE, #2310, Atlanta, GA 30326

Manager  
ERP/Supply Chain Systems

## J.M. Huber

This position will lead the design, development, and installation of ERP (Oracle) systems to support the company's supply chain and information delivery systems. Will also prepare project plans and manage resources for business system projects and supervise employees.

The successful candidate will have a Master's degree in Computer Science, Information Science or Engineering, and a minimum of 3 years of experience in systems analysis and/or development, or a Bachelor's degree and a minimum of 5 years of experience. Stated experience must include work with ERP systems and 2 years of Oracle experience.

If you are interested in applying for this position, please mail a resume and salary requirements to: J.M. Huber Staffing Manager 4401 Northside Parkway, Suite 600, Atlanta, GA 30327. E.O.E.

Unix Systems Administrator, Charlotte., NC: Dvlp. & maintain business applications for trading floors using Unix technology. Provide application support for Lotus Notes, Netscape, Windows Terminal Server. Work w/ Solaris Unix Operating System. Perform server installations, upgrades, break/fix, backup & recovery. Provide desktop support for trading floor environment. Install, upgrade, configure & maintain network configuration for file servers, database & web servers. Reqs. BS in Comp. Science, Engineering or MIS & 2 yrs exp as a Unix Systems Admin., System Admin., or Network/Systems Engineer. The 2 yrs of exp. must include with DNS, DHCP, Solstice Disk Suite, Veritas, Trading Systems (incl. Brass, Bridge, Autex, and/or Instinet), Hardware Configuration, Jumpstart, A1000/A3500/SSA, rm6, Sendmail, Network Topology & systems trouble shooting. Send resume to Donna Mason, FUNB, 1525 West W.T. Harris Blvd., Chlt., NC 28262-0775.

## Software Engineer

Provide web based billing application for customer support/tracking, invoice and credit/adjustment creation, correspondence and reporting using JAVA, JDBC, HTML, Javascript and PL/SOL. Integration, implementation and customization of web based E-Commerce uni-billing and customer tracking system for various services using Java, JFC, JDBC, CORBA, and PL/SOL built on Oracle 8.i. Must have at least a BS or BT degree in Electronics Engineering or CS or related degree, and two yrs. of exp. in above position or two yrs. exp. as Software Engineer or rel. position w/ability to use: JAVA, JDBC, HTML, Javascript, & PL/SOL 40.0 hr/wk. \$65,000/Yr 8:00 AM - 5:00 PM Applicants send cover letter and resume to:  
Ramsoft, Inc.  
7020 Magnolia Park Lane  
Norcross, GA 30093

SOFTWARE ENGINEER: Proven ability in using ORACLE CASE Designer to produce Entity Relationship Diagrams (ERD), Data Flow Diagrams (DFD) and Functional Hierarchy diagrams. Demonstrated ability in using the ORACLE tool set SQL\*Plus, SQL\*Net, SQL\*Forms and in developing embedded SQL statements using Pro\*C: Demonstrated ability in developing procedures, functions and database triggers using PL/SQL for server-end processing. Demonstrated ability in developing protocols to connect database from system software's using C and UNIX and in developing front ends and reports using Visual basic and Crystal reports. Job duties include creation and configuration of the Regional Database, setting up data replication between master and slaves, coding scripts to monitor performance. Requires B.S with 2 yrs of software development experience. 40 hours per week at \$48,000 per year. Please send resume to Case # 19990053, PO Box # 8968, Boston, MA 02114.

SOFTWARE ENGINEER: Proven ability in using SYBASE POWER DESIGNER to produce Entity Relationship Diagram (ERD), Data Flow Diagrams (DFD) and Functional Hierarchy Diagrams. Demonstrated ability in developing stored procedures, cursors and database triggers using TSQL for server-end processing. Experience in administering the database using DB Artisan tool. Working knowledge in developing screens and writing power script for client using POWERBUILDER. Job duties are Analysis of current procedures and problems to refine and convert the data to programmable form; determine output requirements; study existing systems to evaluate effectiveness; upgrade systems presently in use; develop, test and implement new software; correct/systems programs as necessary. Requires Bachelors in Engineering with 2 yrs of software development experience. 40 hours per week at \$60,000 per year. Please send resume to Case # 19990389, PO Box # 8968, Boston, MA 02114.

SOFTWARE ENGINEER: Shelton, CT location. Two years SW experience or MS CS/EE with C/C++ programming, knowledge of NT device drivers and Microsoft tools. Familiar with TCP/IP and other communication protocols, Sockets, Com/Dcom. Will assist team members in all phases of development for real-time embedded applications and control systems. Additional responsibilities will include the design and modification of code following detailed specifications and participating in test/debugging.

We have flexible work schedules, progressive career path opportunities, and a business casual environment. Our benefits, including a 401(k) plan, retirement plan, tuition reimbursement, and incentive program are hard to beat in our industry. For consideration, please rush your resume to INRANGE Technologies Corporation, Job GC2000-06, 13000 Midlantic Dr., Mt. Laurel, NJ 08054 fax:856-439-3100 or email to hr@inrange.com EOE M/F/D/V

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**Computer Programmer Analyst:** Plans, develops, tests and documents programs. Evaluates user requests for new/modified programs, convert project specs. into sequence of instructions for coding, enter codes/commands to run and test program, detect/modify syntax/logic errors, analyze programs to increase efficiency, write manual for and train users. Oracle, Visual Basic. Req: B.S. Comp. Sci. and 2 yrs. exp. in job offered. 40 hrs/wk, 8-5pm. Job in FL. Send resume to Allen Systems Group, Inc., Corporate Recruiter, 1333 Third Avenue South, Naples, FL 34102.

**Sr. Systems Analyst-Analyze/design/develop/qualify/test/support** lrg scale client-server prod in Windows NT, define customer reqts, prepare/present conceptual & detail design, translate designs to software prod using develop tools (Windows NT/Borland's Delphi/Microsoft C/Visual C++/Microsoft SQL/Paradox Crystal Reports/Word/Excel/Access/Lotus Notes). B.Sc. Engineer. or Computer Science + 2 yrs exp as Systems Analyst reqd. Exp must incl. DP500/DP1800/Windows NT/item processing technology/Unisys IPS. \$62k/yr, 40 hrs/wk, OT as needed. Send resume to: D. Root, HR Director, REF#RN, 155 Technology Pkwy, Ste 400, Norcross, GA 30092.

**Software Engineer:** to assume responsibility for advanced electrical applications for Energy Management Systems & Distribution Management System including research & design of software applications. Require MS or equivalent in CS or EE. Proficiency in FORTRAN, C and Unix. \$63,500-68,000/yr., 40hr/wk, 8:30 a.m. - 5:30 p.m. Contact Advanced Control Systems, Human Resources, 2755 Northwoods Pkwy, Norcross, GA 30071.

**SOFTWARE ENGINEER:**

Experience in using front-end development tools like Microsoft Visual Basic and Access to develop GUI applications. Demonstrated ability to work on databases like Oracle, and DB2 in developing procedures, functions and database triggers using PL/SQL for server-end applications. Proven ability to work on Windows 95, Novell and Unix operating systems. Job duties include developing database applications in Client/Server environment; studying the existing system to evaluate effectiveness, upgrade systems presently in use; developing procedures; functions and data definition language scripts. Requires Masters in Science (or) Computers with no experience required. 40 hours per week at \$ 65,000 per year. Please send resume to Case # 19983854, PO Box # 8968, Boston, MA 02114.

**Senior Software Engineer** - Duties include utilizing global flow analysis and related techniques to generate optimized program executables. Will be responsible for significant design and implementation work to implement both short-term fixes and long-term performance improvements. Requirements include a Master's Degree or equivalent in Computer Science or Computer Engineering. No experience required. Applicants must have unrestricted authorization to work in the United States. Salary \$75,004.80/year. 40 hours/wk. Respond with two copies of resume to Case #19990137, P.O. Box 8968, Boston, MA 02114.

**Multiple Openings for Software Engineers, Project Leaders, Programmer Analysts & Sr. Programmer Analysts.** Candidates must have minimum BS/MS in Computer Science or related field and experience in one or more of the following areas: C, C++, JAVA, JAVASCRIPT, HTML, VB, VBSCRIPT, CRYSTAL REPORTS, UNIX ADMIN., ORACLE, PL/SOL, DEV2K, COBOL, CICS, IMS, VSAM, DB2, PEOPLESOFT on Mainframes, Client/Server, Unix, Win-NT, and SunSolaris. Send resumes with the salary requirements to Prosoft Solutions, Inc. 15310 Amberly Drive, Suite#165, Tampa, FL 33647. Attn: Raghavacharyulu Kidambi. Fax: (813) 972 3282 e-mail:pro-soft@mindspring.com

**SOFTWARE ENGINEER:** Design, Development, Testing and implementation of commercial/business application systems; Demonstrated ability in design and development of applications using Oracle 7.x/6.x and Oracle Tools such as Oracle Forms 4.5/ SOL\*Forms 3.0, PL/SOL Oracle Reports 2.5/ SOL\*Reportwriter and SOL\*Menu; Demonstrated ability working in VMS and UNIX; Demonstrated ability in performing Oracle Database Administration (DBA). Requires: M.S. in Comp Sci, Math, Engg or related field plus 2 years experience in job offered or software development; 40 hrs/wk, 8:00 a.m. to 5:00 p.m.; \$75,000/yr. Send two (2) copies of resume/respond to: Case #19983849, PO Box 8968, Boston, MA 02114.

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**Senior Programmer Analyst.** Req. master's degree (or equivalent) in computer science or related field plus 2 yrs. experience in job offered or in the design, implementation and coding of BaaN, and use of UNIX, Oracle as a database, BaaN EDI and BaaN Exchange.

**Senior Programmer Analyst/Team Leader.** Req. master's degree (or equivalent) in computer science or related field plus 3 yrs. experience in the design, implementation and coding of BaaN and its modules & related integrations, including one year as a team leader, and use of UNIX and Oracle as a database.

**Send resume to Barbara Grandel, Engine Controls, Automotive Controls Corporation, 175 N. Branford Rd., Branford, CT 06405.**

**System Analyst/Programmer**

Perform analysis, design, development and implementation tasks for computer based systems and procedures. Program using Microsoft COM, Visual C++ on Windows NT and Roguewave C classes on UNIX systems. Able to use SOL and MS SOL Server and Unix Oracle databases. Must have at least an MS degree in CS or related field, and two yrs. of exp. in above position or two yrs. exp. as System Analyst/Programmer or related position w/ability to use: object oriented programming, C, Visual C++, SOL Server, Oracle, & UNIX. 40.0 hr/wk. \$61,256.00/Yr. 8:00 AM- 5:00 PM

**Applicants send resume to:**  
James Johnson, Manager  
2A-SDS  
7301 Baymeadows Way  
Jacksonville, FL 32256

**Application development Supervisor** - \$70,000 per year. 40 hrs/wk - 8:00 am - 5:00 pm. Responsible for development, design, implementation & deployment of an Internet-software product using Windows & UNIX based (Linux) programming, Visual Basic, SOL (Structure Query Language), C++, Java, Databases - MS Access, MS SOL Server, & Windows API (Application Program Interface). Supervises 4/5 programmers & manages their day to day operations. Require a BS in Computer Science, one year on the job experience as Software Developer, which must have included programming in C++, Visual Basic, MS Access in a Windows & UNIX based. Send resume & cover letter documenting minimum qualifications to: Roy Gilbert, Operations Manager, Virtual Learning Technologies, 1401 20th Street South, Suite 300, Birmingham, AL 35205, EEO

**Software Engineers** wanted by investment banking company in Greenwich, CT. Must have a Master's in Computer Science or Electrical Engineering and 3 months experience designing, developing and implementing back office software systems for a financial services entity, including systems used to trade and price complex fixed income instruments, utilizing Unix C/C++, Perl, TCP/IP and IPC protocols, SOL and Sybase. Respond to Dave MacWilliams, Greenwich Capital Markets, Inc. 600 Steamboat Road, Greenwich, CT, 06830.

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**Application Programmer-40 hrs/wk, 9am-5pm M,T,Th,F, & 11am-7pm Wed.** \$44,500/yr. Located in Boca Raton, FL. Reqs. a Bachelor's deg. in Comp. Sci or Mgmt Info. Systems & 2 yrs exp in the job offered. Convert shoe design specifications using flowcharts & diagrams into sequence of detailed & logical steps for coding into Autocad software & C language processable on IBM OS2 with AS/400; analyze & review graphic output & alter programs to increase operating efficiency & conformance to manufacturing needs; back-up systems after normal work hrs. once a wk. following rotation schedule. Send resume to Dept. of Labor/Bureau of Workforce Program Support, P.O. Box 10869, Tallahassee, FL 32302, Att: L. Knight, Re: JOFL #2054368

**Programmer Analyst -**

Jackson, MS - Analyze reqs, design, test & implement info mgt sys using NATURAL, Natural Construct, ADABAS & Visual Basic. Req: Bach in Comp Sci/Data Processing, Math or Engr & 5 yrs exp M-F, 9AM-5PM, 35 hrs/wk, \$35.00/hr. Send resume to: MS State Empl. Service, 5959 I-55 Frontage Rd., Jackson, MS 39236-3348, JO# MS2887121

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The successful candidate must have strong technical experience with medium to large UNIX environments running Oracle applications, including HP-UNIX as well as Solaris. In addition to an advanced degree in computer science and 8+ years of experience with Oracle, you will have demonstrated leadership abilities, the ability to work effectively with business owners, IT management, and IT/IM staff, and the ability to design, tune and troubleshoot an Oracle and SQL Server environment. Must be familiar with UNIX shell programming, SQL and SQL tuning.

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**SOFTWARE ENGINEER** to provide full life cycle development utilizing PeopleTools, PeopleCode, SOR and SOL to analyze, modify, upgrade, test and implement packaged and customized applications for Human Resources and Finance business groups using PeopleSoft Financials, HR, PeopleTools; design technical specifications for PeopleSoft interfaces, customizations, reports and data conversion; build and test interfaces, customizations and reports using PeopleTools, SOR, UNIX and Oracle. Require: B.S. (or equivalent) in Computer Science/Information Systems and three years experience. Salary: \$65,000 per year, 8.30 am to 5:30 pm, M-F. Apply with resume to: President, Sarvani, Inc., 2024 Powers Ferry Road, Suite 204, Atlanta, GA 30339



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Fundtech Corporation  
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Norcross, Georgia 30092

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# IT Careers in Software Development

Just as the pilots are the cowboys of the aviation industry, so too are software developers the frontiersmen of the information technology industry. Software developers emerge as the people who make it happen - who link idea into reality, and then make it better.

The career opportunities are aplenty, from front-end B2B interaction to creating applications that are driving everything from e-commerce to digital cameras.



by Carole Hedden



## Amazon.com Seattle, WA

Among the dot-com companies of the world, Amazon.com clearly is the organization where new things happen daily and where the frontier is someplace underfoot. "We're looking for people to sharpen that online experience for our customers," says H.B. Siegel, director of media technology. "This is a vertically integrated operation, where we need people to work in rich media on every aspect of the customer experience."

While reticent to reveal what's planned for the coming year, Siegel says the person going to work at Amazon.com will put his hands on everything. "We need people with a rich media interest."

"We're doing some really exciting things to improve the online shopping experience," says Siegel. "For instance, we've added a new feature to our review capability. Some of our reviewers provide more useful and credible information, so we've found a way to aggregate the most useful reviewers - to provide a review of reviewers so to speak. Amazon.com is a leader in this area of developing the community arena."

Siegel says Amazon.com stands alone as an employer. "This is a place where you'll look forward to coming to work," he says. "There aren't many jobs like that, and it's great to be excited about what you're working on. We have a unique position in

changing the way people experience commerce, and you can be part of that. Creating customer value is our goal, and we're using great technology to do so."

From an intellectual intrigue stance, Siegel believes Amazon.com has the best to offer. "We've gone beyond the commercial market for software development," he says. "Our problems are those that others will be trying to solve in the future at a fraction of our scale. We aren't creating new applications because we want to say we invented it - it's because we are the first to try these things."

Generally, Amazon.com employees work in small groups of multiple skill sets, working on a defined set of deliverables. "The only mistake is to take too long," adds Siegel. "We make sure people understand the requirements and then set them loose. It's a little bit like working in triage - we work hard and then move on. The organization is fluid, coalescing around needed skills more than any established matrix or hierarchy."



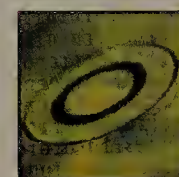
## Breakthrough Software San Jose, CA

Breakthrough Software is a breakthrough company, working off venture capital to establish a new software approach to enable e-commerce. Using a proprietary approach to Web-enabling software, Breakthrough Software is helping small businesses grow and offer their wares across the Internet.

Bob Walker, staffing manager, says the best example of the company's target market is small businesses. "That's who we cater to - helping smaller businesses set up their own e-commerce sites using our storefront models," he explains. "If the business is stronger, we have the software that enables you to further customize your e-commerce ability, building your business and your storefront."

Walker says attitude is the number one attribute he's looking for in hiring new employees. "There are lots of people in this business who are capable of doing the job," he says. "But this is about more than skills. We need people with an attitude about learning and helping businesses grow. We need Internet software-based skills but also the ability to deliver on our promise."

"As a start-up we need to hire sharp people and ramp up quickly," adds Walker. "You have the flexibility to customize the opportunity and what the company will become. You'll have to do many different jobs, and people tend to embrace that because it prevents your work from becoming mundane."



## Lawson Software St. Paul, MN

The East Coast and West Coast may lay claim to the high tech frontier, but here in St. Paul, Lawson Software is carving out new territory, too. "We are an enterprise e-business application provider organization," explains Amy Kadow Fafinski, director



of human resource recruiting and staffing. "We provide solutions, whether it's financial, human resources or procurement/supply chain."

Through Lawson Insight 2 some of its latest analytic applications, Lawson has gone the next step – to computerized decision making. "This is a business management application that allows executives to make decisions, based on information they extract using this software," says Fafinski. "It's a robust analytics solution that allows people to look at information from different directions, not just through a flat spread sheet for instance."

Lawson plans to hire about 550 people in 2000, up about 33 percent. Positions are open in regional offices throughout the United States in major metropolitan areas as well as their global facilities. Most research and development work does take place in the corporate offices in St. Paul.

"Because we offer a variety of services, there is a lot of opportunity," says Fafinski. "We want people who have previous software industry development experience, who can manage multiple projects, and who can change direction at a moment's notice. Many times we pursue multiple paths to respond to a single requirement. And, we're looking for people who believe in customer satisfaction – that's our business."

The company is an open systems development organization. "That's attractive to most people," says Fafinski. "We also are the first enterprise software to be Web deployable. We've always focused on new ways of doing things and that's what keeps people excited about working here. The languages you've used in developing software are important, but we're more interested in your creativity and work style."

Career planning occurs through the company's performance management process, and Lawson Software University provides technological course-work and exploration. In addition, employees take part in customer focus groups, providing them with first-hand information on the customers' future needs and thus the skills and capabilities that will be required.

"Sometimes people think of Minnesota in hoaky quaint terms, but most people who come to Lawson are truly amazed at how helpful and nice people are. There are no pretenses," Fafinski adds. "When you consider our competition, who are up to 20 times the size of Lawson, you'll find that our work environment and what Lawson offers is very competitive."



### **Nikon USA Melville, NY**

For more than seven decades Nikon has been a standard-bearer in imaging technology. In more recent years, the technology has expanded, today encompassing a growing number of software applications that enable Nikon's rich history of engineering know-how.

"There are big plans for the new century," says Barbara Ponzo, employment specialist for national recruiting. "We have a large number of jobs being driven by the digital field as literally thousands of new digital cameras are on backorder. The consumer demand is tremendous. Nikon was recently awarded the 'Excellence in Imaging Award' by *Popular Science* magazine and Digital Focus for our CoolPix 950 consumer digital and D1 professional Digital SLR cameras."

Along with the D1 camera, the professional photographer receives a copy of the software that enables him or her to fully utilize that photograph.

However, photography isn't the only opportunity. "We have a number of different technologies at work," adds Ponzo. "This allows the software professional to avoid stagnating."

Chris Marshall, software development manager for Nikon's Photo Division, says "because Nikon makes the best digital cameras and film scanners in the world, you'll be working on some of the coolest stuff there is. There are good toys here to play with."

The technology used by the Photo Division, as well as the Instruments Division, is based on both Windows and Macintosh use. "We have unlimited potential for leadership opportunities," says Marshall. "Software is the basis of image quality so the whole camera structure is moving behind software. After all, our customers look at the digital camera and the software as an integrated unit so the software has to be taken every bit as seriously as the camera itself."

### **Rick Banister - Sesame Technology**

Rich Gruskin, who heads software engineering for science and technologies, says his group continues to grow as the company expands its offerings for scientific and technological instrumentation. "We're writing the applications for a variety of instrumentation equipment," explains Gruskin. "For instance, we recently began work on producing the software that goes with Nikon hardware for inspection equipment used in an Intel fabrication plant. We also have a line of surveying products. The software provides for the automatic download of data from Nikon field instruments for a building site, loading into a CAD system and then drawing the measurements.

It's exciting work, where we write applications that make things move. The future will see a lot more with robotics and machine vision."

Marshall and Gruskin agree that the Nikon brand name sets the company apart from other employers. "Here, you can work on things you'll be proud of, something that people ooh and aah over," says Gruskin. Ponzo agrees, saying that the company is looking for people who possess the desire to learn, who not only have the technical schooling, but who are ready to work on worldwide Nikon teams, "ready to be excited about our customers' needs."



### **Sesame Technology Scotts Valley, CA**

While a significant portion of the IT industry chased Y2K, Sesame Technology stuck to its vision – providing successful, trend-setting business applications for the IT divisions of growth-oriented companies.

"We've built our reputation on rock-solid execution and by leading the trends," says corporate vice president Rick Banister. "We were early in becoming Oracle specialists, especially in conjunction with the Web, and we have continually built on this."

"Our recent focus has been with data warehousing and e-commerce. Our strategy is to hit new technologies at the beginning of the wave and as competitors catch up, we have

already turned our attention to the next new technology to the future." With this strategy, Sesame Technology devotes serious talent and time to developing implementation protocols for early adopters of technology. "We tend to invent the methodologies," Banister says. Most recently, the company has deployed Web-based versions of applications, building demand for people who can combine Oracle and Java-based skills with Web skills.

"We look for people who have seasoned experience in the industry. We're looking beyond the buzzwords and the languages you can code to your ability to solve problems. That's the difference between a programmer and a software developer and the most important skill of all – solving real-world problems."

Tightly knit teams develop Sesame's projects. "That allows you, as a member, to come out with the best skills imaginable," he says, "because we're developing survivable, state-of-the-art programming."

Banister says that while the company remains a privately held organization, employees are highly motivated by receiving stock options. "We want people to participate in decision making. But there is a serious absence of politics here," he adds.



### **Syntra Technologies New York, NY**

In the world of software development, Syntra Technologies has carved out a niche for itself by creating real-time and online applications that provide for financial, logistical and regulatory exchange around the world. The company provides software products to a broad range of companies, from the traditional Fortune 1000 to upstart e-commerce operations. Throughout 2000, Syntra will be rolling out a suite of products that are Web-based.

The company merged in early March with International Software Management in the United Kingdom, providing an overall presence in North America, Latin America, Asia, Western and Eastern Europe. Syntra now has a global footprint in key markets that will address a huge appetite for e-commerce solutions.

It's a long way from how the company started. Syntra's founders were at Columbia University in graduate school, working on a thesis that addressed the concept of export automation. The project became a company that today is the market leader in global commerce management and export/import automation.

### **Rich Gruskin - Nikon USA**

"We're hiring at a steady rate and sending people to our customers to help them set up these new applications that connect buyers and sellers across borders and through the Internet," adds Teri Caperna, manager of human resources. "We're looking for talented, seasoned technology experts who are highly motivated and want to make a difference. Syntra is defining its space and there's great opportunity for career development and cross-functional training."

Caperna says that learning is a crucial part of the company's operation. "As you work, you will be developing skills," she says. "We do have a job rotation system in place and cross teaming. We operate a highly-flexible organization, which provides a great opportunity for people who want to build a skill set that is as broad as it is deep."





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**Carol Lasker**, Associate Publisher  
Debbie Lovell, National Sales Operations Manager  
Internet: [clasker, dlovell@nww.com](mailto:clasker, dlovell@nww.com)  
(508) 460-3333/FAX: (508) 460-1237

**NEW YORK/NEW JERSEY**

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Elizabeth Ardizone, Account Executive  
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Linda Bishop, Sales Assistant  
(508) 460-3333/FAX: (508) 460-1237

**MID-ATLANTIC**

Jacqui DiBianca, Senior District Manager  
Internet: [jdibian@nww.com](mailto:jdibian@nww.com)  
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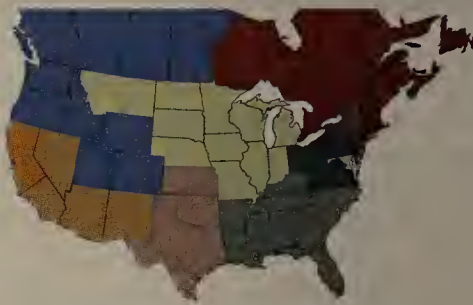
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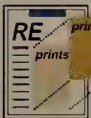


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## Audit, continued from page 1

academic computing and communication at the University of Illinois (UI), Chicago. He had UI's telecom bills audited and the school ended up \$350,000 richer for it.

Phone audits like this have saved enterprises money for years. But now with the advent of competitive local exchange carriers (CLEC) and budget tightening at regional Bell operating companies, enterprises should be even more cautious, experts say.

Newer carriers can be prone to making errors because they're not yet familiar with their own billing systems, says Walter McDermott, who runs Telephonic Auditing Service in Ridgewood, N.J. "You ask for a customer service record, and they're not sure what it is. It has taken a week or more in some cases for me to get anyone who can read a bill that they are sending to their customers," McDermott says.

CLECs are also more difficult to deal with in an audit because often they resell a Bell service. "They picked up a bill from the Bell and passed it

auditing firm in Chicago. "They hide behind their voice mailbox," he says.

So auditors recommend getting your bills reviewed every 18 to 24 months to make sure new errors don't accumulate.

Finding out if you're overpaying can require no upfront money. In many cases, auditors work for a contingency fee — a cut of up to half the overcharges they find.

"There is no downside. Of course, the vendors don't like it because it means they have to pay some money," UI's Kraemer says.

When network executives enter into an audit, many of them expect something other than what they get. For example, auditors never look at whether enterprises are being billed for individual phone calls they didn't make. In the scheme of things, that kind of error is chicken feed.

"I'd have to find a lot of mistakes to make it worthwhile, and then it would only work for this month," Telephone Auditing Service's McDermott says.

Instead, auditors hunt mistakes that can cost tens or hundreds of thousands

of dollars if left uncorrected, such as whether canceled T-1s are still showing up on the bill.

Auditors scour bills looking for that kind of error. "We investigate if in fact you have that line, is it working, are they billing you right," Tariff Billing Specialists' Francini says.

Large companies need auditing more, experts say. Often the biggest corporations have clout to negotiate the best deals, but those special-case deals are often so complex that service providers frequently miscalculate the bills.

Services that were set up on an individual case basis (ICB) are even more ripe for error. "I hear ICB rates and I say, 'Great, we're going to make some money today,'" D Squared Communications' Dabney says.

There are more types of billing errors than you can count. Dabney says he reclaimed \$250,000 for a client because the local phone company had been sending the wrong customers' bill for a year and a half. The name at the top was correct, but the network was someone else's.

Embarcadero Systems, a network management firm in San Francisco, won an \$18,000 credit for a T-1 line that was billed at the wrong rate for six months. And the company ducked a looming \$30,000 penalty because it was about to miss a minimum service agreement. The auditor, Applied Research Technologies, got the penalty forgiven and renegotiated the contract, says Doris Moblech, network manager at Embarcadero.

Auditors employ databases that compute the distances between switching offices to find out whether mileage charges are accurate. They check whether you're being charged at the four-wire rate for a two-wire service.

UI's Kraemer says his long-distance carrier was charging for phone lines that were not used by the university.

In addition to looking for billing errors, auditors take information about customer networks and try to figure alternative — and less expensive — ways to accomplish

the same goals.

For example, Applied Research checked the rates Embarcadero was paying for various services and ranked whether it was paying at the high or low end of the accept-

"If we never followed up, there's a 90% chance they will never get off the ball. Two years later you'll find you are still paying for those two lines you thought you had corrected. You need to follow up by reviewing the bill, or you'll never know for sure it happened," Francini says.

## Not to worry

Audits could have political implications. Some telecom managers may fear that if long-standing large errors are found, blame may be placed on their heads. But UI's Kraemer says he's not concerned about that. He's calling in expert help, just like he does for technical projects. "How can I know if something is a tariffed item or not? I can't know everything, and I would not expect my staff to know everything," he says.

Customers might also be worried about the cost, but in most cases, the auditor's fee comes from the value of the errors discovered. If an audit discovers savings that extend over post-audit years, the auditor gets a cut of that, too.

Embarcadero paid a flat \$50,000 for its audit, and Moblech says she prefers that to a percentage, based on experience at a former job in which she hired an auditor that worked on commission alone. "It gave me an uncomfortable feeling to be paying them based on numbers they generated, and I had no way of checking," she says.

Once you decide to get audited, the process is simple. You hire an auditor and sign over authority for the firm to deal with your service providers on your behalf. The auditor takes it from there and within weeks reports back with what it has found.

Initial meetings with the auditor take three or four days, Moblech says. "You describe your network, why you designed it the way you did, what your objectives are," she says.

While the first audit was her CEO's idea, she now plans to do one every two years before negotiating new service contracts with carriers. "It really helps to have a second pair of eyes that know what they're looking for take a look at your bills," she says. ■

**"It's like getting money from heaven."**

Steven Kraemer, assistant director of academic computing and communication at the University of Illinois, Chicago.

able range. Intra-state long-distance was high, so Embarcadero renegotiated for a best-in-class rate, Moblech says.

One auditor says he has found customers still paying 30 cents per minute for long-distance simply because no one ever called the phone company to demand better rates.

Auditors also offer buying strategies for services. One recommendation: Take the long-term discount carriers offer on T-1s. If you don't keep the service for the term of the contract, many carriers simply make you pay back the discount with no additional penalty. So if there is a 40% discount for a seven-year commitment to the service, but you cut it off after a year, you pay back the 40% for that year, but no penalty for the other six years.

Auditors also advise signing only one-year long-distance contracts because prices are falling so fast, it's worth renegotiating often.

Telecom auditors can play hardball for you, too. If a carrier says it only refunds for errors made over the past six months, but state law requires paybacks for six years, auditors can press that case.

But carriers are generally cooperative. Tariff Billing Specialists' Francini says that in 22 years of auditing, he has appealed cases to state public utilities commissions only a half dozen times.

Once the audit is done and the carrier has agreed to the mistakes found, the auditor should ride herd on the service provider to ensure the changes are made.



## Auditors are your friends

Telecom auditors turn their trained eyes on your phone bills and evaluate a number of problem areas to save you money.

on, so if there is an error, it wasn't made by them," says Barry Francini of Tariff Billing Specialists in Florham Park, N.J.

ROBOCs have experienced turnover and are short-handed, so it's hard to get hold of their billing experts, says Dave Dabney, president of D Squared Communications, a telecom

of dollars if left uncorrected, such as whether canceled T-1s are still showing up on the bill.

Auditors scour bills looking for that kind of error. "We investigate if in fact you have that line, is it working, are they billing you right," Tariff Billing Specialists' Francini says.

Eighty percent of bills con-



## Wireless,

continued from page 16

Time-Division Multiple Access (TDMA) and Cellular Digital Packet Data (CDPD) networks are fine for handling today's short message service (SMS) and Wireless Application Protocol (WAP) services. But the company knows demand for robust applications is on the rise.

"These are low-bandwidth services. The current bandwidth conditions aren't a problem for most business users," says Rodrick Nelson, senior vice president and chief technology officer at AT&T Wireless. "But WAP-enabled Web sites such as portals into corporate networks are mushrooming" and will require more bandwidth, he says.

AT&T Enterprise PocketNet CDPD service users can now access Lotus Notes or Microsoft Exchange applications via their wireless handsets, but users are limited to 19.2K bit/sec. While 19.2K bit/sec may be fine to receive a message, it is typically too slow for accessing a full list of customer contacts or downloading a day's worth of e-mail.

AT&T Wireless customers won't have to deal with slow speeds for the long term, the company says. The service provider plans to upgrade its network to support 384K bit/sec using enhanced data rate for global (EDGE) technology.

However, EDGE network gear isn't expected to be available until 2002 or later, says Callie Pottorf, an industry analyst at IDC, a market research firm in Framingham, Mass. And AT&T isn't planning interim technology upgrades.

Gartner's Egan warns that AT&T may have more of a challenge upgrading its network

than some others. "AT&T has a patchwork quilt of network technologies with clever multi-mode handsets that glue the network together from an end-user's standpoint," Egan says. But in addition to TDMA and CDPD, AT&T is also still supporting its analog network, he says.

Another carrier hard at work on a network upgrade is GTE Wireless. It will begin 3G1X trials this year and has plans to start deploying the new gear next year. GTE Wireless' network is based on CDMA in the 800-MHz spectrum band.

GTE Wireless now offers its customers SMS and Net access data services at 14.4K bit/sec. The company has wireless Web business offerings in the works, but details are not yet available.

GTE Wireless expects to upgrade its network to 3G in 2002 or 2003, says Don Fye, director of network technology development at the carrier.

Bell Atlantic Mobile, which will soon be merged with Vodafone AirTouch and eventually with GTE Wireless if both mergers are approved, also has its sights set on a 3G upgrade.

The yet-to-be-named combined company will have more than 23 million customers and will be the largest domestic wireless service provider. But that doesn't put Bell Atlantic Mobile ahead of the pack in upgrading its network infrastructure.

Bell Atlantic Mobile currently offers wireless Internet access over a CDMA network in the 800-MHz spectrum band and a CDPD network. Dick Lynch, the carrier's chief technology officer, says he knows firsthand that accessing Microsoft Outlook from his wireless phone is downright "painful" at 14.4K

bit/sec. But it's better than no access at all, he says.

Lynch says Bell Atlantic Mobile is aggressively rolling out 3G1X services this year, which will mean wireless transmission speeds up to 144K bit/sec. While Lynch wouldn't pinpoint an availability date, he says, "it won't be snowing when we make the announcement."

Although Bell Atlantic Mobile is offering CDPD services now, Lynch predicts it will be "gracefully transitioned" to IP packet-based services that will run over its CDMA network.

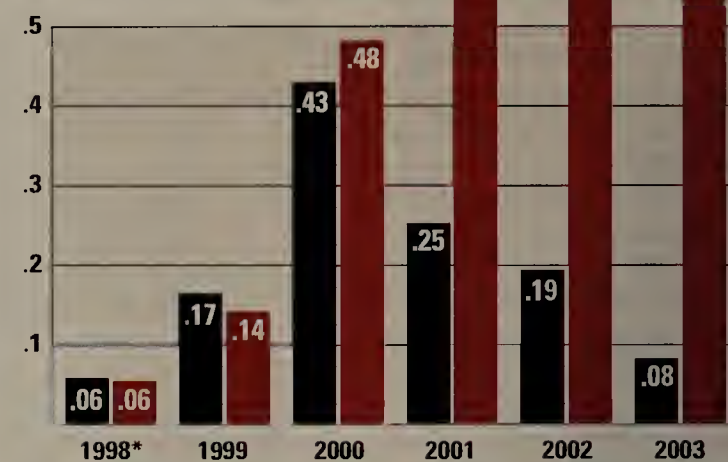
Whether business users are accessing their corporate networks over a CDPD or CDMA network isn't as important as their ability to mimic the same capabilities they have on their desktops, handsets, PDAs or even laptops with a wireless modem. Without the ability to quickly and easily link up, business users will continue to only tiptoe into wireless data service offerings, experts say. ▣

## Wireless packet proliferation

IDC predicts there will be nearly nine million subscribers using circuit- and packet-switched wireless Internet services by 2003, compared to just over 100,000 in 1998. Increasingly, these subscribers will use packet-based services.

■ Circuit-switched ■ Packet-switched

U.S. wireless subscribers who have Internet access (in millions)



\*Actual subscribers; all other figures are projections based on vendor and end-user research.

SOURCE: IDC, FRAMINGHAM, MASS.

## Analyst: MCI WorldCom/Sprint deal at risk

BY DAVID R. H. D. E

MCI WorldCom and Sprint last week dismissed a report by a prominent analyst that says the U.S. Department of Justice will block the two carriers' proposed merger.

Scott Cleland, lead analyst for the Legg Mason Precursor Group, said the Justice Department is preparing to request an injunction against the merger in federal court. MCI WorldCom and Sprint would then have the right to seek a trial, but Cleland noted that few mergers delayed in this manner ever go through.

MCI WorldCom and a Sprint spokesman said the companies remain confident the merger will be approved and closed in the second half of 2000. The Sprint spokesman added that his company is taking care to identify its Internet customer and network assets so there is no confusion in case of a spinoff.

In addition, other analysts put their own spin on the report. A.G. Edwards sent out a note disagreeing with Cleland's analysis, while adding that even if the merger is blocked, Sprint's value should hold up as an acquisition

target for someone else.

In his report, Cleland repeatedly cited what he called the "failure" of the 1998 spinoff of the former MCI Internet backbone to Cable & Wireless — the key move that sealed government approval of the merger between MCI and WorldCom.

The current MCI WorldCom has broadly signaled that it would be willing this time to spin off Sprint's Internet business, but Cleland says the Justice Department doesn't think that's nearly enough. In a harsh assessment, Cleland says the Justice Department is "embarrassed that the MCI divestiture to Cable & Wireless went so badly," and added that the regulators "harbor a 'fool me once, shame on you, fool me twice, shame on me' attitude towards MCI WorldCom."

Cable & Wireless last year sued MCI WorldCom, charging, among other things, that the MCI Internet customer records they received were fouled up. Cable & Wireless customers themselves also complained the transition was rocky. The two companies recently settled the case, with MCI WorldCom agreeing to pay \$200 million.

MCI WorldCom did not admit

to any wrongdoing, but Cleland says the settlement "strongly suggests that the Cable & Wireless' charges of competitive damage from anticompetitive conduct had merit."

Among other reasons the merger is in trouble, according to Cleland:

- The Justice Department has hired top litigation attorneys for the case, something it has rarely done in past telecom mergers.

- The department doesn't buy into theories that regional Bell operating companies will soon be entering the long-distance market in many states.

- The next-biggest competitor, Qwest, will soon be shut out of long-distance service in 14 states because of its pending merger with US West, which is barred from long-distance carriage in its own territory.

- The combination of MCI WorldCom and Sprint not only increases concentration in the long-distance voice market, but also in frame relay and ATM.

Cleland cautioned that the Justice Department's action may not come immediately and may take several months. He went on to say that if MCI WorldCom can't buy Sprint, someone else probably will. ▣

## Internet tax,

continued from page 14

going to know the difference and how to tax that item?" he says.

Having such tenuous definitions also creates major problems for makers of e-commerce software. Trying to automate the tax collection and remittance process is difficult because the more exemptions there are, the more lines of code and updates are needed, Sokel says.

Another sticking point is use fees. If a consumer buys an item and has it shipped to an address

that is not where a company has Nexus, then he doesn't have to pay sales tax to the company. But the consumer is supposed to report it on his tax forms and pay a use tax. States have little to no recourse for collecting these taxes, though.

Sokel says this is less of a problem for business-to-business transactions because purchasing companies are subjected to much more scrutiny by the state. They have to register with the state where they do business and therefore are subject to audits on whether they are paying use fees for their taxable items. ▣



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**Qwest,**  
continued from page 1

same holds for GTE in Bell Atlantic's region.

Analysts have long expected Qwest and GTE to hunt for a carrier to take over their business in the RBOC partners' territories. But they expressed alarm at the speed at which both companies seem to be forcing the change on users.

Qwest is giving customers about three months to transition because its merger is expected to close late in the second quarter. GTE is operating on an even tighter time frame. In a March 1 filing with the Federal Communications Commission, GTE's long-distance unit said it has asked 166,000 residential and business customers to find a new long-distance carrier this month and told business users it will discontinue ATM, frame relay and private line services in Bell Atlantic's territory March 30.

That timing may work for residential long-distance, says Steven Taylor, president of Distributed Networking Associates in Greensboro, N.C. But for revising corporate-network term contracts, "It's a much more complex task than filling out that card that comes in the

mail to get frequent-flyer miles by changing long-distance carriers," he says.

Users will have to stay on their toes, adds Ellen Block, a Washington, D.C. attorney: "Qwest until recently was going after business they knew they would have to divest if the [US West] merger went through."

Carrier executives didn't try to gloss over the blow to one-stop shopping. "It's taking one step back to take two or three steps forward," says Alan Ciamporcero, vice president of regulatory affairs at GTE. "We're giving away customer relationships we've worked very hard to gain." But GTE needs the Bell Atlantic tie because GTE's local territories are largely rural and it wants a stronger competitive position, he says.

Conducting a divestiture with one carrier can be a necessary evil to gain a merger with another carrier, says Stephen Jacobsen, Qwest's executive vice president for business markets.

"It isn't as elegant as it is when you do it yourselves," Jacobsen says. "But I haven't seen a merger yet that solves everything and looks elegant."

Both carriers are laying transition plans they say will help.

## So much for one-stop shopping

By merging with RBOCs, Qwest and GTE are not only forbidden from combining certain services with the RBOCs, but those RBOCs must also sell the services to another company.



### US West

Qwest customers in US West's territory will have to go to Touch America for a variety of services. Internet and Web-hosting customers in the territory will remain with Qwest.

SOURCES: GTE, COPPELL, TEXAS; QWEST, DENVER

### Bell Atlantic

GTE is asking customers in Bell Atlantic's coverage area (except New York) to find a new carrier\* by March 30.

\* Sprint will be the default carrier for voice for those who do not switch themselves. GTE can keep its incumbent local voice and data services in Pennsylvania and Virginia.

GTE has proposed to spin off its Internet unit into a separate company that it could buy back later.

**Novell,**  
continued from page 8

Directory Services (NDS) and retrieved automatically when users want to access them.

Initially, Single Sign-on will be available for NT and

NetWare versions of Novell's eDirectory and NDS Corporate Edition. Linux and Solaris support will follow in future releases of the product.

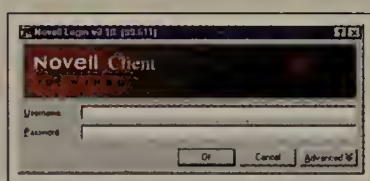
A beta of the next version of Single Sign-on will be available this quarter, with general

release later this year.

The smart client will be available for download and bundled with NetWare 5.X software free. Network managers who want to participate in the smart client beta should send e-mail to pabbott@novell.com. ■

## Novell's Single Sign-on

The new version of Single Sign-on includes the ability to enter a user name and password only once for all network access and applications.



NDS server

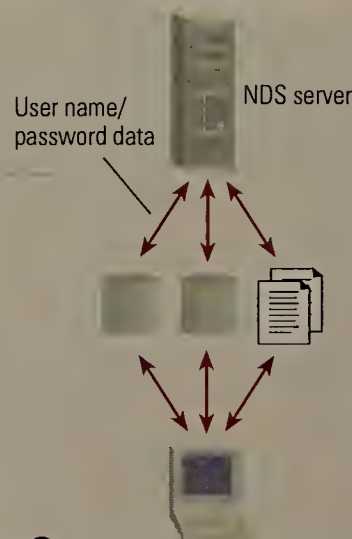
1 A user logs on to NDS by entering his/her user name and password. NDS stores the user name and password, and authenticates the user to the network.



Applications

Secure Web pages

2 The user brings up several applications and Web sites that require passwords and enters passwords for each, which NDS records.



3 The next time the user accesses these applications or Web sites, the user name and password data is passed on via NDS.

branded, unified bill.

In GTE's case, officials note that most of the long-distance frame, ATM and private-line business is actually resold by GTE via other carriers' facilities, especially Sprint. GTE told the FCC it is "aggressively" seeking a specific carrier to offer users as an alternative. Turning over the business to Sprint is "definitely a possible solution," Ciamporcero says.

Unlike Qwest, GTE operates some local fast-packet data networks — in parts of Pennsylvania and Virginia where Bell Atlantic is not the local carrier — and it will keep those. On the voice services, GTE told the FCC that customers who don't choose another carrier would automatically go to Sprint.

But GTE's story gets even more complex: It has also

agreed to spin off its Internet unit, GTE Internetworking, into yet another independent entity (see story, page 41). By contrast, Qwest is hanging on to its Internet business. Officials claim the company's dedicated Net access service is local in nature and its Web-hosting facilities don't inherently involve transport, though Touch America may take over transport for IP virtual private nets.

The FCC, which earlier this month approved the Qwest/US West merger, must still approve the terms of the Touch America sale. Qwest also needs the approval of six more states in US West's 14-state territory before the merger is a done deal. ■

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IPv6,  
continued from page 1

member of the technical staff at Compaq. Bound adds that these announcements mean "the competition among the vendors will increase 10 times . . . which is good for the market and good for IPv6."

Alain Durand, a researcher at Sun and co-chairman of the Internet Engineering Task Force's working group on IPv6 transition issues, says it's important that the two vendors will be shipping IPv6 products this year. "There's a big difference between a prototype and a product," he says. "Corporate customers won't buy it if they can't get support."

Developed by the IETF, IPv6 solves the network address limitation problems of the current IPv4 protocol by replacing IPv4's 32-bit addresses with 128-bit addresses. Because of its longer addresses, IPv6 can support a virtually limitless number of individually identified systems on the 'Net, while IPv4 can support only a few billion such systems.

IPv6 promises network managers the opportunity to rid their networks of problem-prone address translation devices that act as intermediaries between public and private Internet addresses used with IPv4. IPv6 also offers

built-in security and support for advanced multimedia applications.

Despite its benefits, IPv6 has been slow to catch on. Until now, few commercial products were available. The Cisco and Microsoft announcements are notable because they mean IPv6 will be built into Internet routers, network operating systems and applications, making it easier for network managers



MOHNSDART

**"We must have implementation methods that ensure smooth integration of IPv4 and IPv6."**

Judy Estrin, chief technology officer, Cisco

to upgrade to IPv6.

Cisco says it will support IPv6 in Version 12.1(5)T of its IOS, scheduled to ship in October. Later versions of IOS will provide advanced IPv6-related features and improved performance, and future hardware platforms will support IPv6, according to Cisco Chief Technology Officer Judy Estrin.

"Cisco is committed to IPv6, but we're committed to integration, not transition," says Estrin, who urged the IPv6 community to develop tools and techniques that allow network managers to integrate IPv6 with IPv4.

"The current IPv4 infrastructure is stretched," Estrin says. "The larger address space in IPv6 offers advantages and efficiencies. But we must have implementation methods that ensure smooth integration of IPv4 and IPv6."

Cisco's plan is to roll out IPv6 in several phases. The first phase is support in IOS. Next Cisco will integrate IPv6 with other Internet standards, including Multi-protocol Label Switching, IP Multicast and voice over IP. Eventually, Cisco will build IPv6 into its hardware devices.

Milo Medin, chief technology officer of Excite@Home, questioned whether Cisco would provide IPv6 support that is as fast as IPv4. "The devil is in the details," Medin

**■ "The competition among the vendors will increase 10 times . . . which is good for the market and good for IPv6."**

Jim Bound, co-chair, IPv6 Forum's Technical Directorate

says. "If they don't have the performance and tools that you get with IPv4, how useful is it to service providers? To the extent that they have technology that does IPv6 well, it's good for everybody."

Meanwhile, Microsoft will release today its IPv6 Technology Preview, an IPv6 stack for Windows 2000 that software developers can use to create IPv6 applications. Previously, Microsoft offered only a prototype IPv6 stack developed by its research group.

"This is the second step in Microsoft's rollout of IPv6," says Richard Draves, a senior researcher at Microsoft. Draves says IPv6 will be included in the next major

release of Windows 2000, followed by full IPv6 support across all Microsoft products. "We are taking our prototype and turning it into product," he says.

Draves also said that within a month or two, Microsoft will release an IPv6-compatible version of Internet Explorer that is expected to be the first Web browser to support IPv6.

In fact, Microsoft announcements are likely to put pressure on other software vendors, such as iPlanet (formerly the Sun-Netscape Alliance), Oracle, Eudora and Apache, that have not yet committed to IPv6.

"The minimum tools we need to give users are Web browsers and e-mail clients," Durand says.

In other IPv6 product news:

- Compaq announced it would support IPv6 in Version 5.1 of its Tru64 Unix, which is due in September, as well as Version 6.0 of its OpenVMS, which is due in March 2001.

- Sun, which bundles IPv6 support in Solaris 8, demonstrated a simple tool for porting IPv4 applications to run on IPv6 systems that the company plans to commercialize soon. ■

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Alteon,  
continued from page 1

money by enabling them to use fewer expensive router ports to direct traffic through the Web switches and into Web servers.

"This is going to make it a lot easier for us to scale our boxes without having to deal with all the physical interface issues," says Vince Muir, network architect for Loudcloud, a Sunnyvale, Calif., Web services provider that uses Alteon's ACEDirector switches.

Web switches, which typically sit between routers or firewalls and Web servers, are becoming increasingly popular for boosting Web site performance, particularly for companies with e-commerce sites. Alteon is among the leading companies in the market, along with others such as ArrowPoint.

Alteon's new Virtual Matrix Architecture (VMA) works by harnessing all 18 of the 180 series or ACEDirector switches' processors to handle incoming and outgoing traffic. Traffic switching can be done according to predefined rules set by a network administrator and based on such things as URLs and cookies. Previously, each port on the switch only had access to two processors for handling its traffic.

Independent tests done by The Tolly Group show that an Alteon 180 switch with VMA software can handle up to 6,300 customer requests per second, whereas the switch configured with older code handled 1,356 requests.

By comparison, The Tolly Group's tests showed that an ArrowPoint CS-100 switch was able to handle 1,193 sessions per second. The test used WebBench 3.0 and

involved 50 clients flooding requests to 11 servers.

"Quicker response time for people is the bottom line

ArrowPoint did not agree to be part of The Tolly Group's test and questioned the results, based on the fact that

**Ramped-up Web**

Alteon's Virtual Matrix Architecture will add the following capabilities to its Web switches:

- Single-port access to 18 processors. Four times the performance of current software.
- Backwards and forwards compatibility with all stackable Alteon Web switches.

Alteon is adding performance-boosting software to its 180 series and ACEDirector Web switch lines.

here," says Greg Kilmartin, an analyst and engineer with The Tolly Group.

ArrowPoint Communications spokesman Erv Johnson said

ArrowPoint did not have access to the test methodology. He also questioned the relation of the test results to real-world traffic situations.

To install VMA, users need Alteon's Web OS 5.2.99 or later software. Customers who qualify for free updates for Web OS will receive the VMA upgrade in the next release. VMA will also be included in the upcoming release of Web OS, 8.0.

VMA can run on all of Alteon's 180 switches as well as on its ACEDirector line of switches. The 180 series is a Gigabit and Fast Ethernet switch; ACEDirector is designed to handle Fast Ethernet only.

Alteon is not planning to support VMA on its 700 series switches because that line already uses a greater per-port memory architecture, according to sources briefed on the company's plans.

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## How to play tech support Bingo

Some time ago, a new and subversive game emerged to help people while away those interminable corporate meetings: Buzzword Bingo. The game is simple. On a piece of paper, you and a select group of other attendees list words and phrases that typify the jargon of your business.

For example, a Buzzword Bingo list might include such gems as "bottom line," "empower/ed/ing" (variants are always considered equivalent), "give us traction" (omitted if you work for John Deere), "give us runway" (likewise excluded if you work for United Airlines or another carrier) and "leverage."

The object of the game is to listen to the speaker (a novel idea in its own right) and tick

off the terms he or she uses. The first player to check off all the words on their list wins and they jump to their feet and shout "Bingo!" — at least if they are foolhardy enough.

Bravery is crucial here. For example, if you are the assistant to the assistant operations supervisor

and the speaker is the CEO, you might feel a little hesitant to declare your win, but a win is a win. In more competitive circles I hear a win is worth a minimum of 10 points and your points are multiplied based on how many levels of hierarchy exist between the winner and the speaker (junior salesman to CEO would be perhaps five levels, so his score would be 50 points).

It struck me that a similar game can be played in a company's technical support department. Just think how it will lighten the workday when you can scream "Bingo!" in the middle of some employee's endless droning. To make it more interesting, the goal is to be the first to collect 100 points, with each word/phrase being worth one or more points, depending on context.

Here are some potential entries for your game:

- "My PC isn't working" — This

must be included on everyone's list as a starter to get things going, along with "Is this support?," "Have I called the right number?" (but only when used as the first thing the user says) and, "Can you help me?"

- "Can you fix my printer? It's out of ink" — This counts for five points if the user is more than 20 minutes away from you, could get a cartridge from the supply cupboard near his desk and has made you change the cartridge at least once before (if you get there and the printer isn't switched on, score two extra points).

- "I haven't changed anything" — Score double for this one. Double again if you can ferret the truth out of him within 10 minutes.

- "My file just vanished/disappeared/deleted itself" — If you can get the user to run up the file manager, use the find service, find the file and move it to wherever it belongs within 5 minutes, score two points. One point if it takes more than 5 minutes, and you lose a point if you have to go to his machine and do it yourself.

- "My print job didn't come out" — Score double if your organization has more than 10 shared printers and you find the output by lunchtime. If the output is in another state, double your points again.

- "Why can I see some Web sites but not others?" — Worth one point. You can double that if you can get him to confess he was trying to check out [www.buxombabes.com](http://www.buxombabes.com). If the confessor is the CEO or some other bigwig, take 10 points.

- "I spilled coffee/tea/cola on my keyboard" — This gets nothing unless you can persuade him to take the keyboard to the washroom, soap and rinse it, hold it under the hot air drier, and then plug it back in. If all of this is achieved, and it works, score five points.

Finally, score five points if you read "Backspin" and "Gearhead" each week. Happy tech support Bingo playing!

Your phrases to [nwcolumn@gibbs.com](mailto:nwcolumn@gibbs.com).



MARK GIBBS

The latest on the Internet/intranet industry



PAUL MCNAMARA

**Few industries deserve** a painful whipping by Web upstarts more than the old-world insurance companies. So count me among those rooting for the likes of **eCoverage** — [www.ecoverage.com](http://www.ecoverage.com) — which this week begins a national rollout of an online-only insurance service that has been shaking the kinks out in California since September.

Simplicity and convenience are the cornerstones of eCoverage, says founder **David Riker**. The company claims customers can get a competitive quote in less than five minutes by answering 16 questions. Answer 14 more and you've bought yourself coverage. Better yet, the entire transaction takes place in plain English, not industry gibberish.

Online insurance makes sense because insurance buyers do not need face-to-face contact with insurance companies. Nor do they need to see, taste, smell or hold the product. In fact, many of us are just aching for an excuse to wash our hands of our current insurers.

Riker says eCoverage will compete on price, too, although that will be difficult in states such as my beloved Massachusetts that dictate car insurance rates. Where the free market reigns, however, Riker says customers can expect savings of "as much as 20%."

Lending eCoverage financial support are such venture capital heavies as **Accel Partners** and **Softbank Technology Ventures**. Plans call for eCoverage to be serving 30 states by June and all 50 before Halloween. That should frighten the insurance industry's old guard.

**Looks like "The Ozzie Watch"** will continue for a while yet. Industry observers and **Ray Ozzie's** legion of Lotus Notes disciples have been waiting more than two years to see what magic will emerge from the groupware inventor's start-up — **Groove Networks** — which is holed up in an old shoe factory in Beverly, Mass.

According to someone who really ought to know, Groove Networks is planning a June coming-out party ... but people who really ought to know oftentimes don't. Ozzie insists this is one of those times, telling me in an e-mail that the June business "is simply not true."

"We are indeed on the path toward the end-game (whew)," Ozzie says, "but things are still highly variable and we have no launch plan."

Sounds like sometime this summer might be a good guess, though.

And Ray, I'm taking vacation the last two weeks of July, so please don't spill anything then.

**Here's a brief follow-up** to last week's item about online underwear merchants:

"You can get a free \$20 pair of boxers from [www.myundies.com](http://www.myundies.com)," writes **Bil Corry**. "I'm not associated with **myundies.com**, except for the fact that if you register for the free pair of boxers using my e-mail as the referrer, I'll earn extra dollars for buying more boxers, which will undoubtedly make my girlfriend very happy."


While the happiness of Buzz readers and their significant others is important to me, I have a more pressing concern about **myundies.com**: Who spends \$20 on a pair of boxers?

**Boston-area readers** may have heard a radio ad for **CellularOne** that features Network World Fusion czar **Adam Gaffin** in his moonlighting gig as proprietor of **Boston Online**, your one-stop Web address for weirdness and advice relating to the self-proclaimed Hub of the universe. The commercial — funny even if you don't know Adam — delves into the site's "Wicked Good Guide To Boston English," which, as anyone who has been here understands, bears only a passing resemblance to the king's version. So check out [www.boston-online.com](http://www.boston-online.com) — don't forget that hyphen — and learn what "calm ya livva" means in the city that only a "chowdahead" would call "Beantown."

OK, it means cool your jets.

Readers are encouraged to offer up their own examples, along with any Internet news tips and gossip items, to [buzz@nw.com](mailto:buzz@nw.com).





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